Food Manufacture
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Fumigation.

IN VIEW of the considerable increase in the practice of fumigating food factories and warehouses, the recent report by Dr. Monier Williams on "The Effect on Food of Fumigation with Hydrogen Cyanide" is of considerable interest. Many manufacturers who have been compelled, by an alarming increase in the birth-rate of the livestock and the pest population of their premises, to resort to fumigation by prussic acid have been very concerned as to whether any foodstuff which remained in contact with the gas would become poisonous, and hitherto such information as various firms had on the subject has not been published. The report first details the methods employed, but these need no comment here—a recent article in FOOD MANUFACTURE dealt fully with these. The interesting point is the amount of residual gas in fumigated food, which apparently depends on (1) strength of gas, (2) duration of fumigation, (3) moisture content of food, (4) state of subdivision of food, (5) method of packing, (6) subsequent ventilation. Various observers have recorded figures for residual cyanides which differ widely, and these variations are probably due to the different conditions employed; but in general the results indicate the effectiveness of ventilation in removing excess gas (except in the cases of dried and liquid milk, dried fruit, and cheese). Dr. Monier Williams states that there is no reason why a maximum of 20 parts per million should be exceeded for foods which are eaten raw, and in general foods treated with less than 1 volume of prussic acid in 200 volumes of air and subsequently exposed to air retain less than 20 parts per million. Cooking removes almost all the absorbed gas. Sufficient evidence has now been collected to show that if the fumigation is carried out by specialists who understand their job, prussic acid can be safely used without danger either to employés or stock.

Manganese and Nutrition.

There does not appear to be any direct proof that manganese is indispensable for normal growth and development. The fact that it may be present in organs and tissues may have no real physiological significance, and it may behave like silver, mercury, and other heavy metals. But, as Richards points out (*Biochem. J.*, 1930, vol. 24, p. 1572), the steady increase of manganese in the developing egg, the invariable presence of the element in such tissues as the reproductive organs, and the constancy of the amount, not only in these organs, but also in those most closely connected with the processes of assimilation (a constancy which is fairly well maintained when large amounts of manganese salts are added to the diet), are facts which suggest that manganese is no accidental constituent of the organism, but may have some intimate relationship to the vital processes. Richards has examined the manganese content of plant reproductive organs, and while wide differences were found in different plants there was little difference as regards manganese content between the male and female organs of the same plant. The analysis of lupin seeds at various stages of development shows that there is a marked increase in total manganese as the seed grows to maturity, which seems to suggest that manganese is an essential element in the development of the plant. The work of Davidson (*Cereal Chemistry*, vol. 6, p. 133) on the manganese contents of various cereals indicates that their manganese content is reduced when the germ and outer covering are removed. It would be interesting to know what the manganese content of wheat germ is, as the nutritional value

of wheat germ may be connected in some way with its manganese content. Boycott and Cameron (*Lancet*, 1930, 959) have examined a number of foods and condiments, and found that manganese was absent from cockles, whelks, and limpets, marmite, tomato ketchup, essence of anchovy, salad dressing, chutney, pickles, lobster paste, mustard, capers, caraway seeds, and coffee. It was present in winkles, oysters, mussels, scallop, shrimps, tea, mixed spice, cloves, and olives, among others. It is interesting to note that these investigators were searching for manganese as a possible cause of cirrhosis of the liver in drunkards, but their results led them to the conclusion that a vegetarian teetotaller would probably take in more manganese than a heavy drinker.

Food Fakes.

In the latter part of 1930 Mr. Gabriel Jones gave a paper before the Liverpool Section of the Institute of Chemistry on "Food Fakes, Ancient and Modern." This interesting paper has now been printed and circulated amongst the members of the Institute, and should be read by every chemist and food manufacturer. It deals with the monstrous practices of adulteration and faking which were prevalent in the past, and which ultimately led to the framing of the Food and Drug Acts. Tennyson wrote years ago: "And chalk and alum and plaster are sold to the poor for bread, and the spirit of madness works in the very means of life." And in "The Flying Inn" we read:

> "He sells us sands of Araby
> As sugar for cash down;
> He sweeps his shop and sells the dust,
> The purest salt in town."

Undoubtedly food has from time immemorial been one of the favourite soils in which to sow the seeds of wealth, and unscrupulous manufacturers and dealers have thrived mightily on it throughout the ages. So accustomed did they become to adulteration that they saw no harm in it; we remember the old (and, we hope, untrue) story of the sanctimonious grocer who called to his apprentice every morning: "Well, John, have you watered the tobacco?"—"Yes, sir."—"And sanded the sugar?"—"Yes, sir."—"And chalked the flour?"—"Yes, sir."—"Very well, then; come in to prayers." In the days of Pliny "white earth was added to bread, and a special officer at Athens had to be appointed to deal with the adulteration of wine." The natural wines of Falerno could not be obtained unadulterated. In the fourteenth century loaves short in weight were augmented by lumps of iron, and the Lord Mayor of London found bundles of wood, pieces of sulphur, and quantities of gravel in casks of wine. An amazing book, published about 1830, describes how oil of vitriol was added to gin to produce pungency and strength, capsicum and paradise grains to provide a flavour, extracts of orris and angelica roots to give a fulness of body, and sulphuric ether and phosphorus to develop a highly spirituous effect, and finally, white arsenic to produce a thirst to make the unfortunate imbiber return to his poison!

Mr. Jones' lecture, which was given in an amusing and topical manner, should certainly be read by all connected with the food industry, for besides being amusing it traces how the law has developed to prevent the continuation of the criminal practices of adulteration so injurious to public health, and shows that our food laws to-day were framed for very sound reasons.

Natural and Artificial Fruit Essences.

The differentiation between natural and artificial fruit essences is a matter of some difficulty and great importance. Recent work by Miermeister seems to indicate that chloramine T (paratoluene sulphonchloramide) is a useful reagent for this purpose. The method employed is to add in the first case chloramine T to an aqueous extract of the essence in presence of acetic acid. After four hours potassium iodide and sulphuric acid are added, and the iodine is titrated with sodium thiosulphate to give a value *A*. A second portion is shaken with water and extracted with ether, the residue from evaporating the ethereal extract is taken up with aqueous alcohol, and the chloramine value obtained as before to give a figure *B*. The values of *A* were determined for 22 natural and artificial essences, and in the case of anise, vanilla, strawberry, raspberry, and mandarin the ratios of the values for the natural to the artificial were 12·3 : 0·9, 24·7 : 38·9, 6·8 : 29·0, 1·8 : 17·0, and 10·0 : 35·2 respectively. The difference between the values of *A* and *B* is taken as the chloramine value of the non-volatile reducing substances. The results indicate that natural cocoa, coffee, anise, vanilla, currant, strawberry and raspberry, and artificial strawberry, gooseberry, raspberry, and vanilla essences contain only a small proportion of steam volatile matter. The method is not yet completely developed or entirely satisfactory, but undoubtedly it is a step in the right direction, and even now should prove of great value in differentiating between natural and artificial essences. It is interesting to note that chloramine T is marketed under a number of names, including aktivin, mianin, chlorazene, and tolamine.

Preserving Flavour and Colour.

The preservation of fruits and vegetables by freezing and storing at low temperatures offers many difficulties. It is well known that some vegetables

and fruits, when thawed and cooked after having been frozen and stored at low temperatures, develop very unpleasant flavours and odours. This development is probably due to slow biochemical changes brought about by ferments, either during freezing or thawing, or both. The recent announcement by the Department of Scientific and Industrial Research that "a development which may be of considerable practical importance in connection with the preservation of vegetables by freezing has been made at the low temperature research station at Cambridge" is of special interest. The announcement goes on to say that at this station, which is supervised by Sir William B. Hardy, F.R.S., it has been discovered that these unpleasant and undesirable "changes can be prevented, particularly in the case of peas, by boiling or blanching and washing the vegetables, which may then be frozen and stored in the frozen conditions in suitable containers either under a covering liquid or exposed to air. By this treatment the colour and flavour of the vegetables are preserved unimpaired." It would appear that the ferment or enzyme which brings about the decomposition responsible for the odour is destroyed by heat. The action may possibly be caused by an organism which attacks the protein matter, liberating traces of sulphuretted hydrogen, and which is exterminated by boiling. Whatever is the explanation, the practical importance of the discovery is obvious, and it may be of great value to the canning and preserving sections of the food industries.

Fungi in Butter.

Grimes, Kennelly, and Cummins have carried out an examination of butter samples taken with all suitable antiseptic precautions from the interior of a 56 lb. sample which had been kept at low temperature for two weeks, since it was packed at an Irish creamery. The cream is pasteurised, and as none of these moulds was found to survive the temperature of pasteurisation it is concluded that they have probably entered the butter either from the churn or the air (many creameries are near the road-side, which increases the risk of contamination from this source). A list of twenty-nine moulds found in the butter is given in the *Scientific Proceedings* of the Royal Dublin Society, vol. 19 (N.S.), October, 1930, and the authors note that many of them appear to deviate a little from the standard type of their species, which they think may be due to a process of development of insular strains, peculiar to Ireland.

Sugar Research.

Dr. Edward R. Weidlein, Director of the Mellon Institute of Industrial Research, announces that the Institute has lately begun a broad investigation into possible industrial uses for raw and refined sugar. The research will be carried on by a multiple industrial fellowship sustained by the Sugar Institute, Inc., of New York, an organisation that represents the cane sugar refiners of the United States. The investigation will be supervised by Dr. George D. Beal, assistant director of Mellon Institute, and by Dr. Gerald J. Cox, Senior Industrial Fellow. Four chemists have begun the initial scientific research of the industrial fellowship, and additions will be made to this staff, as needed, from time to time.

Cholesterol.

Lincoln M. Lampert has described a method for the determination of cholesterol in dairy products (*Ind. and Eng. Chem.*, Analytical Edition, 1930, April, p. 159). Tables are given showing the cholesterol contents of milk fat, milk, cream, condensed milk, skimmed milk, fresh, powdered, and frozen egg yolk, powdered egg yolk in ice-cream, and ice-cream mix without egg. The results indicate a value of 1·36 per cent. for the whole fresh egg yolk. Powdered egg yolk gave about 2·5 per cent.; in some samples a lower content was found, and investigation showed that some manufacturers of egg products for ice-cream use make an egg powder containing added milk proteins or sodium caseinate, the latter increasing the viscosity of the ice-cream mix.

Details of the methods used for cholesterol determination are given. A general conclusion reached is that if the normal sterol content of a food product is known, an index to the amount of egg yolk added to that product may be found by determination of the total sterol content.

The Sterols.

Cholesterol $C_{26}H_{43}OH.H_2O$ is a white, unctuous secondary alcohol crystallising from an alcoholic solution in pearly rhombic plates. It enters into the composition of animal fats and oils, brain tissue, the skin, and human bile. Its isomer, phytosterol, is characteristic of vegetable oils and occurs, for example, in cottonseed oil and lanolin; it crystallises in needle form. These sterols take on antirachitic properties when they are irradiated with ultra-violet light. Research has shown that it is not cholesterol itself that becomes activated, but another substance, ergosterol, which is present in minute quantities. Thus ergosterol is sometimes regarded as the parent substance (pro-vitamin) of vitamin D. Ergosterol was obtained first from ergot and then from yeast or mushrooms. Whether it is the only unsaturated sterol upon which antirachitic properties can be bestowed is doubtful, though investigations by Windaus and Hess of a large number of sterols gave negative results.

Lactose for Babies.

Various investigators have proved that the digestion and assimilation of lactose occur more slowly than is the case with the vegetable carbohydrates. It is also generally accepted that this sugar facilitates the absorption of calcium and phosphorus, and, moreover, does not bring about the development of excess fat. Recently Jarvis in America has used modified formulæ containing lactose in over 1,000 consecutive cases, and in his opinion the use of this sugar produces more living tissue than vegetable sugar; it lessens the danger of the development of habitual anorexia or constipation, and forms a source of galactose for the growth of the central nervous system. The food consisted of cow's milk, water, and lactose, mixed cold and boiled for three minutes. Prepared in this way the lactose milk was well tolerated, the sugar being increased to the requisite amount in 10-gm. doses at three-day intervals. The value of lactose in this direction should be of interest to manufacturers of baby foods.

Pulverised Vegetables.

W. Tobler (*Schweizerische medizinische Wochenschrift, Basel*, 1929, Vol. 59, October 19, p. 1052) reports experiments with a vegetable powder containing spinach, carrots, tomatoes, and starchy substances. The author tested the value of these pulverised vegetables in animals. The preparation was given either raw or cooked, but better effects were obtained when given raw. The author then employed the pulverised vegetables for feeding 100 infants and small children. He found the preparation especially helpful during the period when an exclusive milk diet is no longer sufficient. He asserts that pulverised vegetables have certain advantages over vegetables that are prepared in the usual manner. In many cases when vegetables are first introduced into the infant's diet, digestive disturbances develop, and many children develop an aversion for them for a time. The use of pulverised vegetables eliminates both these disadvantages, and thus the transition from the exclusive milk diet to the mixed diet is made easier. The vegetable powder is also of great value in those localities in which, during the winter and spring months, there is a shortage of vegetables.

Vitamins in Beef Extract.

Hoagland and Snider (*Journ. Agric. Res.*, 1930, Vol. 40, June, p. 977) report a series of experiments carried out to determine the relative amounts of growth-promoting vitamin G (pellagra-preventive) in commercial beef extract obtained from different manufacturers. Relative amounts of vitamin G were estimated by feeding tests with young albino rats, using samples of beef extract from five different sources. Fresh lean beef was examined for comparison. It was estimated that 1 lb. of concentrated beef extract contained approximately the same amount of vitamin G as 11 lbs. of fresh lean beef.

Bacon Plants in Lithuania.

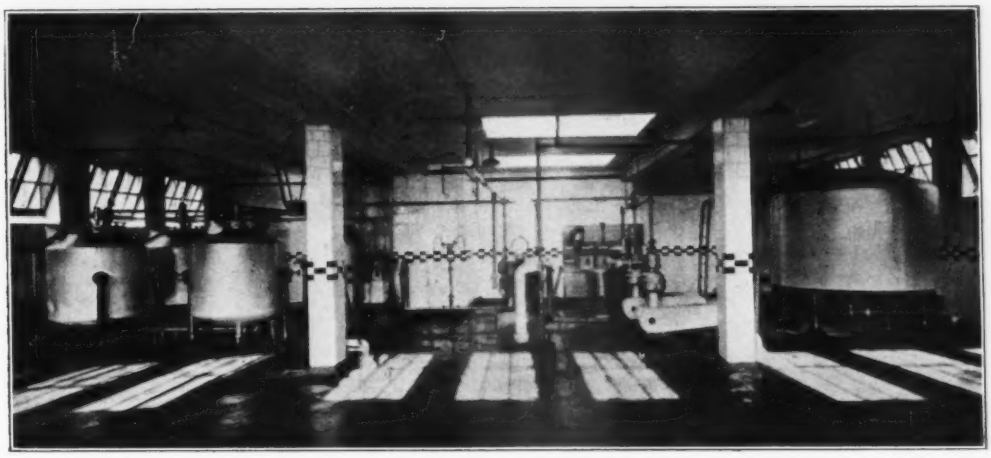
Reports from Lithuania indicate that because of the recent increase in bacon exports, as well as the rapid development of hog raising in Lithuania, two new bacon plants—one in Siauliai (Shavli) and one in Ponevezys (Ponievesh)—will be built, and the plant in Kovno enlarged.

Tinfoil Contamination.

In view of the remarks in the annual report of the Chief Medical Officer of Health (Sir George Newman) relative to the possible contamination of foods by metals, particularly in the case of processed cheeses wrapped in tinfoil, Dr. Bernard Dyer's report to the Essex Council is of interest. He stated that cheese is a substance which necessarily contains free lactic acid, and must have some tendency to attack metal, but he thought that some of the more sensational cases which had recently caused alarm must have related to cheese that had been packed for a long time before being examined. Dr. Dyer had analysed thirty-five samples, none of which were entirely free from tin, but he stated that it was very difficult to draw a logical line between what might be regarded as possible and what might be excessive. It had generally been accepted that contamination up to 2 gr. per lb. need not be taken seriously. Out of the thirty-five samples referred to, seven contained more than 2 gr. per lb.; these were all samples of imported Gruyère cheese, either Swiss or French.

It has not been proved that the presence of tin in amounts exceeding 2 gr. per lb. has any ill effects on the consumer; but, at the same time, the most fair, all-round policy—and one which is most readily accepted by all concerned in this controversial matter—would appear to be to keep down to a minimum all foreign matter such as metals, preservatives, and so on.

It has more than once been suggested that a way out of the difficulty would be to find a substitute for tinfoil. We may point out, however, that all packers and manufacturers of cheese have been for years studying this question of wrapping, and the conclusion arrived at would appear to indicate that the most satisfactory material to use is tinfoil—especially coated tinfoil, which prevents direct contact between cheese and the metal.



Aluminium Pasteurising Plant for Milk.

The Manufacture of Infants' Foods

By THOMAS McLACHLAN, A.C.G.F.C., F.I.C.

The following article is based on extensive factory experience. After a preliminary discussion of important considerations and a description of the chief types of infants' foods, the author proceeds to an outline of the plant and processes used in their manufacture.

IN A previous article on this subject Dr. E. H. Callow urged that no preparation intended for use as an infants' food should be placed on the market without a full declaration of its contents. Although many manufacturers are now following this suggestion, the apparent disclosure of the composition of many foods is actually frequently misleading. Some protection in the form of an Excise stamp should be introduced, so that makers may be enabled and obliged to give this information without fear of any of their rights being infringed.

The manufacture of infants' foods has now become an industry of some importance, largely as the result of civilisation, but partly because the modern mother is unwilling to undergo the inconvenience of suckling her offspring. The general principle underlying the manufacture of these preparations is to supply a standardised article to replace the mother's milk, and for this purpose cow's milk is the only one which can be conveniently employed in most countries. It differs considerably, however, in its composition from human milk; it is not yet a standardised article, in spite of the large milk combines, nor is its bacteriological content always above suspicion. For practical purposes the composition and the amount of fat in both milks are very similar, although the emulsion in human milk is much finer than in that of the cow. Lactose is present in both, but a human baby requires twice as much carbohydrate as a calf, whilst the latter, being an animal of comparatively rapid growth, demands a greater supply of protein for body building and obtains it from the relatively large proportion of casein contained in its mother's milk. According to many authorities the molecular composition of casein differs in the milks of various animals, but it has a very complicated structure and little is known about it, except that certain properties can be easily modified artificially. In the ordinary way the curd obtained from cow's milk is much heavier and thicker than that from human milk, and, even when sufficient water has been added to reduce the casein contents to similar amounts in both fluids, the same difference is observed, but, if cow's milk be homogenised, the clot is no longer heavy on curdling and resembles that of human milk. The addition of various carbohydrates to milk can also affect the curdling: thus dextrin increases the heaviness of the clot slightly, while the sugars, particularly maltose and dextrose, make it lighter and more flocculent. In the preparation of artificial foods both homogenisation and the addition of sugars are employed for this purpose. The four plates provided by Messrs. Benger's Food Company show the type of modification effected by the addition of carbohydrates to milk and by partial peptonisation of the casein. Plate I. shows the clot obtained when a mixture of cow's milk and water is curdled by the addition of rennet and hydrochloric acid at 98° F. Plate II. shows the curd formed when barley water is substituted for plain water; in Plate III. Benger's Food has been used and digestion carried out for 15 minutes, while in Plate IV.

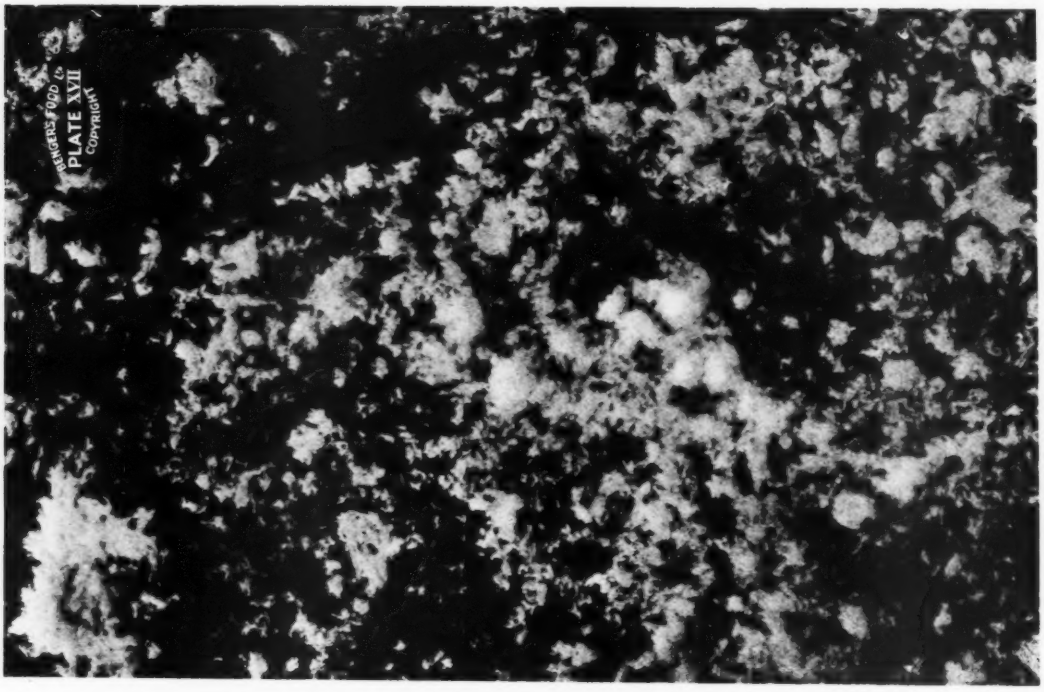


Plate II. (× 2 Diameters.)

By courtesy of Benger's Food, Ltd.

Plate I. (× 2 Diameters.)

the digestion has been allowed to proceed for half an hour.

Another difference between human and cow's milk is that of reaction, for, whereas human milk is slightly alkaline, that of the cow is amphoteric and, as usually sold, just acid. In many hospitals, where so-called physiological feeding is adopted, instead of alkali lactic acid is actually added to the prepared food to make it curdle rapidly on entering the baby's stomach, thus preventing the formation of a heavy curd; but, for obvious reasons, in the preparation of an artificial food it is better to adjust the reaction so that it is as nearly as possible that of the article to be imitated, and, for this purpose, alkalis as citrates or carbonates are added.

The makers of all these foods advertise the use of their particular preparations as the best and most logical method of bringing up baby when natural methods are not available; yet their methods of manufacture and the composition of their products vary enormously, so that, even where the exact information is given, it is difficult for the medical man to decide which is the most efficacious. At the same time, it is not the purpose of the present article to discuss the merits and demerits of the various foods; each one has its own champions who can testify to the results of their favourite method of feeding. The chief requisite appears to be that the flavour, odour, and appearance of each particular food must be maintained, as the public has become accustomed to certain types and refuses to accept any alteration involving even an apparent change only.

Types of Infants' Foods.

Infants' foods may be divided into two main groups:

(1) Those requiring the addition of milk and water in their preparation in the home.

(2) Those which are a complete food in themselves.

Group 1.—It may appear strange to take this group first, but it is not usually recognised perhaps that these foods owe their origin largely to Liebig, who, about the year 1840, advocated the use of powdered malt flour for the feeding of infants and invalids. Some years before this, about 1810, the first vacuum stills had been constructed, so that it was only a matter of time before a palatable dried extract found its way on to the market for direct addition to milk and water. The first of these preparations was Mellin's Food, and in recent years several so-called "malto-dextrins" have been placed on the market. The composition of these products may approximate to that of a dried malt extract or of a fairly dextrinous glucose, and they may contain from 20 to 50 per cent. of dextrin, 20 to 50 per cent. of maltose and about 10 per cent. of dextrose. It is difficult to understand why European houses should follow the lead of the Americans and speak only of the malto-dextrins present in these powders, since dextrose is a most useful adjunct to an infant's diet, as it is the most easily assimilated of all sugars, and it helps to prevent the formation of a heavy curd in the stomach. Another important constituent of these so-called malto-dextrins is the nitrogen-containing portion, which consists of soluble partially peptonised protein bodies, is readily assimilated, and helps to supply the deficiency of lactalbumin in diluted cow's milk. When the extract is prepared from malt and wheat flour about 12 per cent. of peptones and proteoses is present, but when it is made direct from maize starch the resulting product is almost entirely a mixture of carbohydrates. The chief drawback to these products is that they are dependent on a fluctuating milk supply, as delivered to the home, and that the resulting food is deficient in fat and the fat-soluble vitamins.

Group 2.—These foods may be further subdivided into:

(*a*) Prepared powders containing milk constituents and so-called malto-dextrins, or other vegetable carbohydrates.

(*b*) Whole dried milks.

(*c*) Humanised milks.

(*d*) Other milk preparations designed for various conditions of malnutrition.

(*a*) These foods are taken next on account of their historical position, and are usually made from mixtures of various of the following ingredients: Whole milk, fat whey or cream and whey, a malted extract or malto-dextrin, flour, pancreatin and diastase, so arranged that if free starch is present in the powder, it is always hydrolysed in the process of preparing the food for use. Some of these products are very good, but they are all slightly deficient in fat and in vitamins, with the exception of vitamin D in certain cases.

(*b*) Dried whole milks can be dismissed cursorily, as they have now given place almost entirely to (*c*) the so-called humanised milks, which are prepared from whole milk, fat-whey or cream and whey, and added lactose and cream, different manufacturers blending them in various proportions.

(*d*) At the present time there is a widespread movement to market foods which are admittedly low in fat, made from whole milk or whey, with or without the addition of lactose. As a corrective they may be necessary, but it is doubtful whether any really useful purpose is served by placing them before the public for marasmic or nervous children, on the plea that these cannot digest their full quota of fat, and that, when fed naturally, they never empty the mother's breasts, taking only that portion which is poorest in fat. Hutchison states that although infants fed on a fat deficient diet may appear

fat and healthy, and actually win prizes at baby shows, they are frequently suffering from rickets.

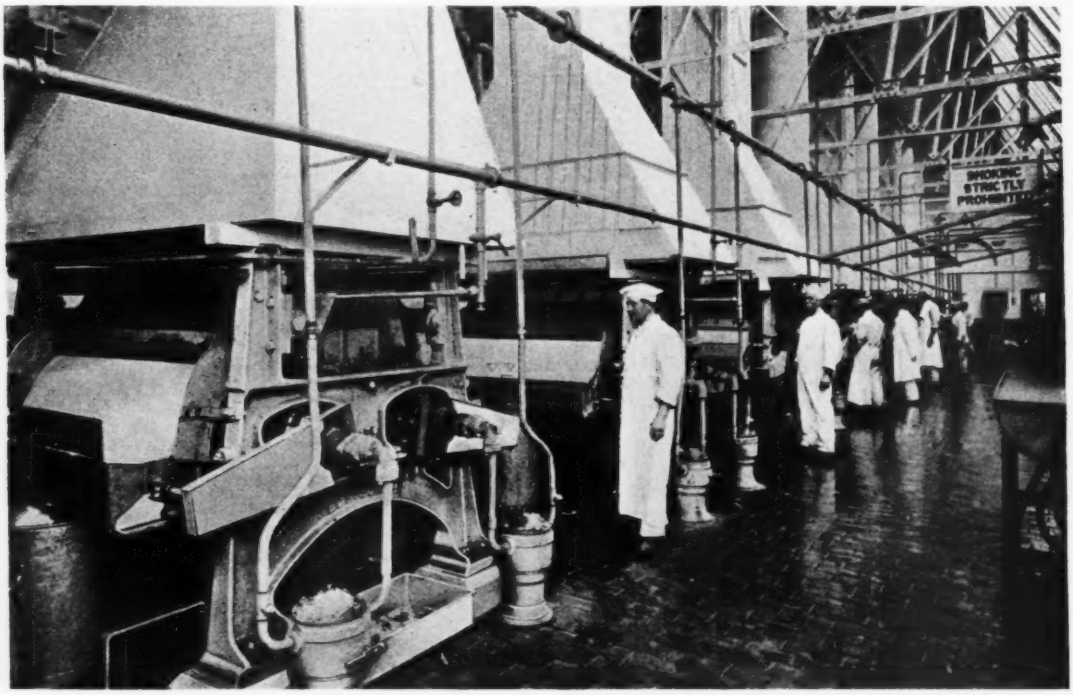
Manufacture.

It is only possible to touch on the several processes involved in the preparation of the different constituents and of their blending, drying, and powdering to produce the finished article for the market; but some of the methods commonly employed in manufacture will be outlined.

The various types of malto-dextrins are made on the general lines followed in the manufacture of malt extract, except that the crushed wheat, maize grits, or starch are boiled with water and cooled slightly before being added to the malt in the mash tun. As wheat starch, in the presence of protein, gelatinises at 61° C., it may be mixed directly with hot water and run into the mash, which is made at a temperature of from 63° to 75° C. The temperature and time of the mash vary according to the required proportion of sugars to dextrin and according to the nature of the raw material. At the end of the mash live steam may be blown in to bring the goods to the boil and to destroy further diastatic action before running off the clear wort; the grains are sparged, or washed, and the whole concentrated in a vacuum pan before adding to the milk or drying. At least one so-called malto-dextrin, which the author has examined, consisted of a dextrin prepared by the acid hydrolysis of starch, mixed with about an equal quantity of dried malt extract.

In cases where the food is sold as a powder containing starch to be saccharified when mixed in accordance with directions, the flour is baked in a slow oven to sterilise it and to rupture the cell wall of the grains, and malt flour is added to provide sufficient diastase to convert it to a mixture of dextrins and sugars. One or two foods contain added pancreatin in order partially to peptonise the casein of the milk before feeding and so avoid the formation of heavy clots in the infant's stomach.

On arrival at the factory the milk is sampled for analysis and freed from dirt by filtration or centrifuging, after which it is processed for the type of food to be manufactured. Whole dried milks having been almost entirely superseded, a portion of the milk has to be separated into various fractions, cream, casein and whey, so that a reconstituted product containing a standardised amount of fat, casein, lactalbumen, lactose and ash may be obtained. The first process involved is the separation of a thin cream in a Laval centrifuge—a high speed machine cannot be employed on account of the danger of breaking down the fat emulsion—and the separated milk is run into large jacketed aluminium pans, fitted with stirring gear, so that the temperature may be adjusted to about blood heat, and the acid may be distributed evenly throughout. Curdling may be carried out either by the aid of rennet or acid, according to the value of the casein to be obtained as a by-product, but, in practice, dilute hydrochloric acid is usually employed. On neutral-



Drying Milk by the Drum Process at the Cow and Gate Factory.

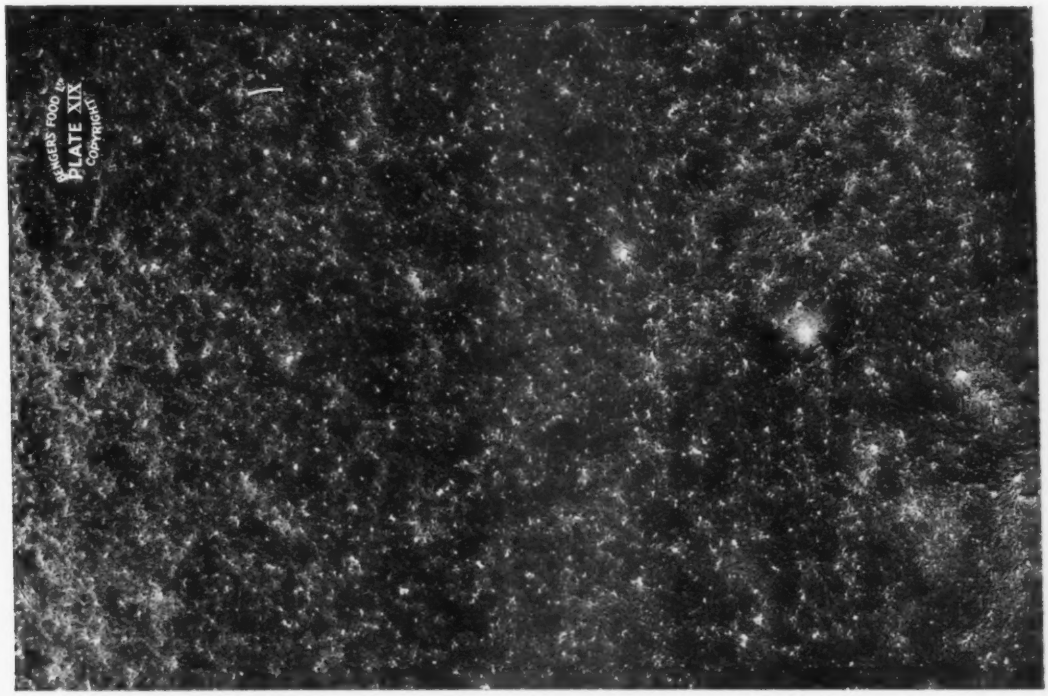
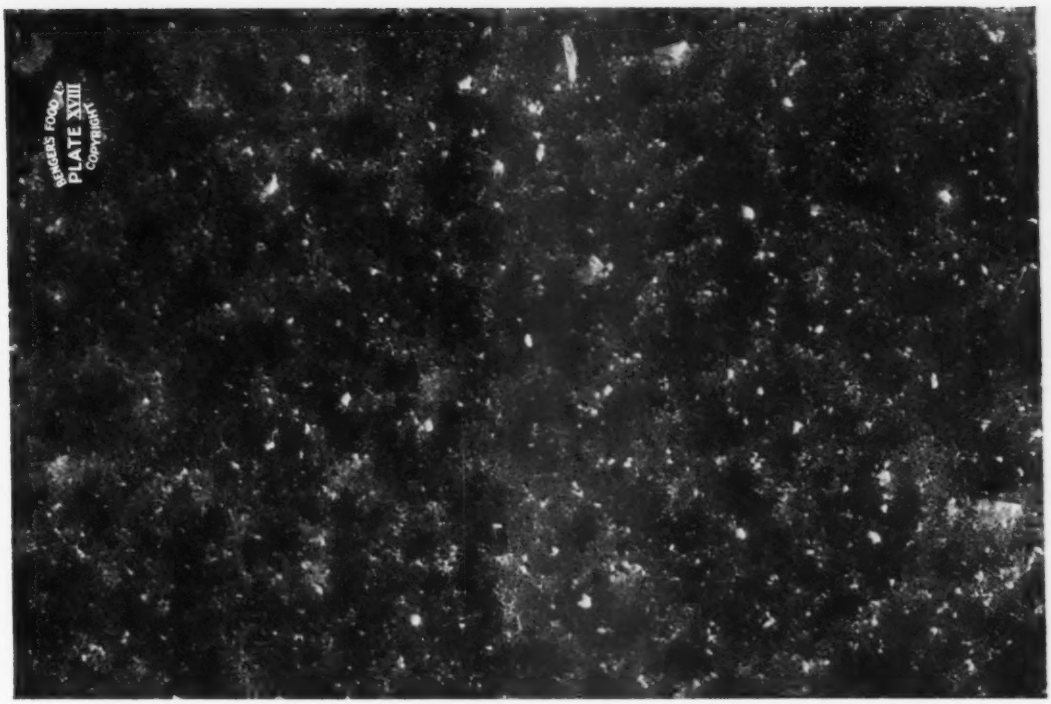


Plate IV. (× 2 Diameters.)



By courtesy of Benger's, Food, Ltd.

Plate III. (× 2 Diameters.)

isation with soda, salt is formed, which is in itself a useful constituent of the food, as cow's milk is deficient in sodium and potassium salts, although rich in calcium. Care has to be taken not to use an excess of acid, as it tends to spoil both the casein and the whey. The extracted casein has a considerable market for use in medicine, cosmetics, adhesives and the ever-growing synthetic plastic industry.

Milk sugar and lactalbumen, if required, are usually imported from Holland, as the milk supply of this country is too valuable to allow of their production in an infants' food factory at present, though attempts are being made to collect the whey from cheese-making factories into various centres and to utilise it for the separation of these constituents.

Three types or combinations of plant may be employed for the drying of these foods:

(1) Vacuum pan and oven.
(2) Hot rollers.
(3) Spray evaporators.

(1) The vacuum pan and oven was the only method available until comparatively recent times, but these have now been almost entirely superseded by processes 2 and 3, as the products obtained are less soluble in water. The process is tedious, and it is said that continuous exposure to the high temperature of the vacuum oven destroys a considerable proportion of the vitamins. On the other hand, the method certainly had its advantages when sterile control was little understood, as the product contains few bacteria, is very palatable and keeps well.

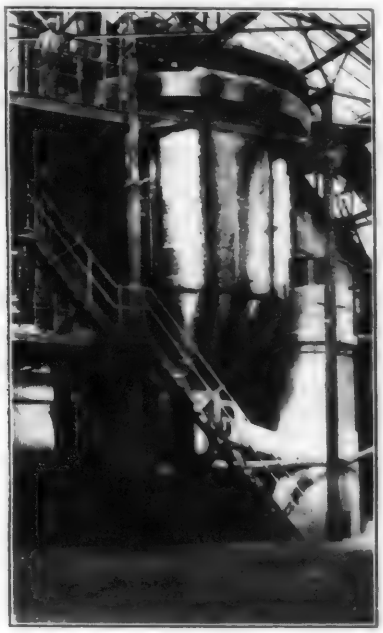
(2) Two variations of the drum process may be employed. The liquid may be fed into a constant level tank, in which rollers heated by steam under pressure rotate rapidly, taking up a thin film of milk on the metallic surface and converting it to a dry skin, which may be removed by a series of knife edges held against the roller, just before this passes once again into the tank to draw a fresh supply of milk. This method of drying prevents oxidation of the fat and the vitamins, as the steam given off from the milk forms a thick blanket over the whole surface, excluding the approach of air, while the milk itself is never heated to a temperature of more than 98° C. When this type of drier is used with modified milks they must be homogenised before running on to the rollers, as there is a tendency for milk emulsions to separate somewhat in the ordinary way. The temperature employed is sufficient to destroy all pathogenic and lactic acid forming but not all thermophilic bacteria, so that theoretically the regenerated milk should form a perfect solution, which would never curdle if kept sterile. Actually the casein is slightly modified by the process, so that the milk is not completely reconstituted as in the spray process, the lactalbumen is largely coagulated, and the addition of rennet no longer causes the formation of a curd. A photograph is shown of this process at work drying food at the Cow and Gate factory at Guildford.

Another form of drum drier has been constructed in which the feed trays and rollers are encased, so that drying may be carried out *in vacuo* at a lower temperature. In order that the dried food is not kept in the moist atmosphere of the drying milk, it falls on to a screw conveyor as it leaves the knives and is discharged alternately into two vacuum receivers at either end of the roller. By means of balancing gear, as each receiver is filled it is automatically cut off and discharged into bins, or into an open conveyor, which carries it direct to the distributing and packing plant.

(3) In the spray process the milk is given a preliminary pasteurisation in the type of pasteuriser illustrated, where the heat exchangers are made of gunmetal, but the milk is kept in aluminium tanks; those shown in the photograph were made by the Aluminium Plant and Vessel Company. Pasteurisation is necessary on account of the low temperature maintained during the process, the temperature never rising above 63° C. The milk is concentrated to low bulk in tubular evaporators, and passed through an atomiser into a chamber in which hot filtered air is circulated. In order to make the distribution of the spray as complete as possible, it is further spread by currents of cold air before coming in contact with that which has been heated to 80° C.; this ensures that evaporation takes place evenly from each of the droplets, leaving the whole of the powder with a constant moisture content. The fact that certain powders become rancid is thought to be due to an uneven moisture content of the various particles contained in the powder, and the manufacturers of the spray plant claim to have overcome this defect. The accompanying diagram illustrates the general principles involved in the Kestner spray chamber. As the maximum temperature of 63° C. is only reached when desiccation is almost complete, the regenerated milk resembles the original article almost completely; it contains most of the ferments originally present, and, since many lactic acid bacteria are present, curdling takes place naturally. Lactic acid bacteria are said to be beneficial for baby and to keep the bowels open and in tone. The fat is present in a very fine state of division, owing to the homogenisation caused by spraying, and is easily digested, but, owing to the presence of a small bubble of air in each particle of powder, it tends to oxidise on keeping and to become tallowy in taste. Other methods give a more palatable flavour, but there is always a tendency for the fat to separate, making it more difficult to digest.

Lampitt and Hughes have shown that a good dried milk should possess a solubility of 99·8 per cent., whereas a poor one may contain only 63 per cent.

of soluble constituents, assuming that the fat is a soluble component, but it cannot be said that it is always a disadvantage for some of the food to be insoluble, since the formation of heavy curds is



A Kestner Spray Drier.

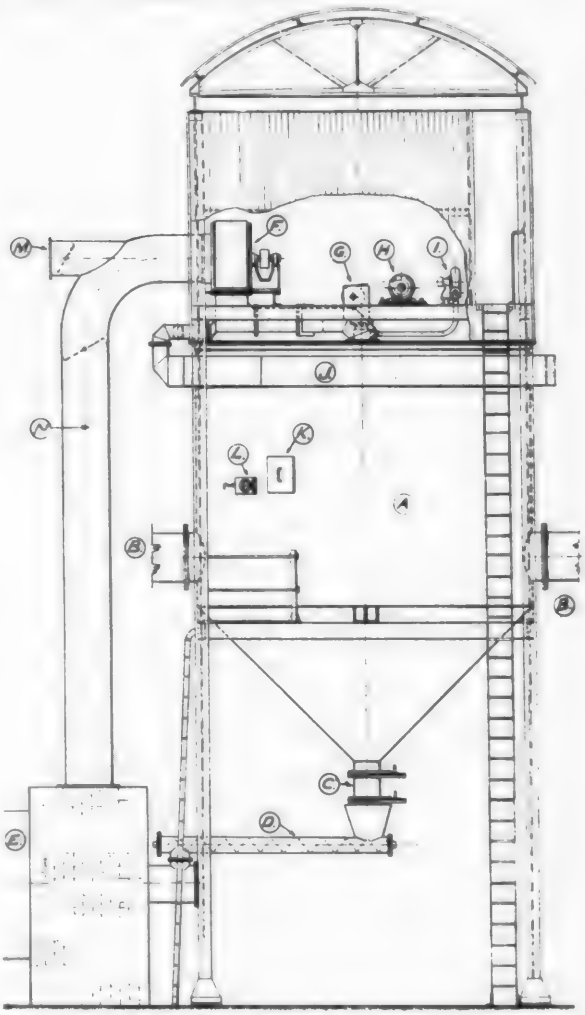
thereby rendered impossible and the particles are therefore more easily attacked by the digestive enzymes.

Vitamins.

Much time and energy have recently been devoted to the subject of vitamins, especially in their relation to infant feeding, and it is now recognised that it is as important to give an adequate and constant supply of these constituents as it is to maintain the balance of fats, sugars, and proteins, with the result that manufacturers have taken more precautions to prevent oxidation of the food during manufacture, and even to add vitamin D in order to maintain it at the level of best summer milk. Vitamin D is prepared by the irradiation by ultra-violet rays of a solution of ergosterol in alcohol, paraffin, or olive oil, the vitamin being added directly to the food. Experiments are proceeding on these lines in order to procure an adequate amount of vitamin A, and it is claimed that the addition of these fat-soluble vitamins makes it possible to employ a food with a lower fat content and to obtain better results. Vitamin C is most readily destroyed by heat and oxidation, the latter factor playing an important part in spray drying, but so far no satisfactory method has been obtained for incorporating this vitamin during the preparation of artificial foods.

Bacteriological Control.

Sanitary control and periodic sterilisation of the plant make it possible to produce a food with less than 10,000 bacteria per gram, and G. J. and A. M. Hucker have suggested that this should be the limit of bacteria allowed in these products. They have found that the bulk of bacteria are present as milk peptonising spore-formers of the *B. Subtilis* type and thermophiles, but from this it would appear that they have only handled powders made by the roller process. Their work shows, however, that, with care, artificial foods may be nearly free from bacteria and that they should become safe standardised substitutes for mother's milk.



A, drying chamber; B, air exhaust; C, outlet; D, conveyor; E, calciner; F, hot air fan; G, atomiser; H, motor; I, cold air fan; J, air duct; K, manhole; L, sight glass; M, free air inlet; N, hot air from calciner.

In conclusion the author tenders his best thanks to those manufacturers who have supplied illustrations, enabling a better grasp to be obtained of the general principles involved in the preparation of these foods.

Colour and Flavouring Problems in the Food Industries

By T. H. FAIRBROTHER, M.Sc., F.I.C.

The writer has had considerable experience of colour problems and difficulties which often perplex the food manufacturer, and in the following instructive article he gives much useful, practical advice.

EVERYONE WHO is manufacturing an article for competitive trade knows how important it is to create an immediate appeal to a potential buyer. There are so many articles of a kindred nature available to-day that sales are effected by what might seem very trivial points—a subtle odour, a delicate shade, a decorative container, or an attractive shape. It is an old saying that clothes do not make the man, but everyone knows that a good man may stand a poor chance if he is not well dressed and does not possess a good presence and smart appearance. So it is with foodstuffs: the quality of the goods may be superlative, the ingredients the finest that money and expert buying can produce, and the technique of manufacture correct in every way, but if they do not make an immediate appeal to the buyer, they will remain for ever in their cases or shop windows. It is therefore incumbent on every food manufacturer who wants to build up a successful trade to study psychology and try to understand those factors which appeal to the æsthetic sense of his customers. He must realise at once that his own meat may be another man's poison and that there is no uniformity in appeal. Some people are attracted by what would be a mortal antipathy to others. He must therefore develop ranges of articles which will offer gradations of appeal to all types of minds. He is not concerned with whether his customer's artistic sense is right or wrong. He wants to sell his goods, not to educate his customers. If a man who was willing to pay for his fancies asked his tailor to supply him with pink silk trousers and a green and orange vest, it would be no more the part of the tailor to dissuade him than it would be his part to persuade others to adopt the same colour scheme. In short, it is the job of every manufacturer to cater for the taste of all his customers. How can he do this without unduly overloading his stock? In food manufacture—particularly in the confectionery branch—this is relatively simple, as by a judicious use of colours and flavours and variation of shapes the same stock material can be placed before the public eye in a hundred and one different guises.

Attraction.

Of all the factors which influence the attractiveness of an article, external appearance is the most important. A customer may not buy an attractive-looking article more than once, but it is certain that, no matter how good it may be, he will not buy an unattractive one at all. Of the features which determine external appearance, colour is probably the most important. It is not the mere presence of colour that matters; bad colouring may be more damning to an article than absence of colour at all. Colours must be suggestive rather than flamboyant; they must be subtle, not obvious. Here is where the artistic sense of the confectioner can be brought into play. In this connection the question of flavouring becomes intimately connected with that of colouring. It always seems wrong to colour mint rock with red—as a child one always thought it should be green; and who would enjoy a yellow strawberry ice? The flavours and colours should harmonise, and if we have an article with an appealing colour, an apposite flavour, and a happy name, there is hope for the salesman.

Colour Problems.

During a considerable experience of food manufacturers who use colours and flavours to improve the appearance of their products, the writer has come across several problems which seem to present certain difficulties. These soon disappear if the manufacturer bears in mind the following points in regard to colour:

1. Source of supply and checking of deliveries.
2. Selection of colours for specific purposes.
3. Dissolving, filtering, and storage of stock solutions.
4. Accurate blending of colours and the keeping of careful records.
5. Recording failures and mishaps as well as successes.

Source of Supply.

The manufacturer who wishes to use colours in his products should make himself acquainted with the Food and Drug Acts and other legislation relative to preservative and colouring matters. After a perusal of these he will decide that it is imperative for him to procure his colours from manufacturers of repute who specialise in the preparation of pure colours for foodstuffs, and who will give him a guarantee of conformity with the provisions of the Acts. It should be realised that a little colour goes a long way, and the actual cost of dye is not of material importance. It is better to pay more and make sure of the genuine article. Another important point in this connection is that reputable manufacturers prepare their colours to a definite tinctorial standard, and the buyer is therefore assured of continuity of shade in subsequent deliveries of any colour he may have used previously. While it is always advisable for the consumer to make some check on all deliveries, the possibility of complaint is

greatly reduced if the best dyes have been procured. Leading colour makers have large laboratories with chemists who are constantly investigating the application of dyes to specific purposes, and these are in a position to advise a food manufacturer as to which dye would be most suitable for his particular purpose, and so save him considerable research.

Selection of the Colour.

One of the most important points to be remembered in selecting colours for foodstuffs is the sensitivity of many dyes to acids or alkalies. The reaction of the substance to be coloured should be studied and the most suitable colour chosen. In this connection it must be noted that colour changes due to reaction of the media may take place very slowly and vary with the temperature, so that trial experiments should not be hurried or conclusions drawn too rapidly. Basic colours should not be used in alkaline media. The effect of light on certain colours should also be noted. If the articles are likely to be exposed in shop windows for any length of time, the light-fastness of the dye must be thoroughly investigated. Acid colours are usually fast to light and generally fast to alkalies and acids, though orange I reddens perceptibly in presence of alkali whilst acid yellow G reddens considerably in acids. Erythrosine, a very useful red dye, is insoluble in acid solutions, and if used in such cases the dye would be precipitated and the colour discharged. Benzo purpurine, a red used for colouring polony skins, turns blue in presence of acids, and so must not be brought into contact with any acid preservatives (such as sulphur dioxide, which is used in sausage meat).

Colours for Confectionery.

The term "confectionery" covers a multitude of operations and articles and includes sweets, chocolates, candies, jams, jellies, custard powders, ices, cakes, fondants, and mineral waters. The general principles apply to all these, but each has its own particular points to be observed. Frequently in the making of boiled sweets glucose containing sulphur dioxide is used, and obviously only SO_2 fast colours should be used. Orange I should only be used if the sugar is acidified. The most general colours used for sweets are tartrazine (yellow), ponceau 3 R and 2 R, amaranth, rhodamine and carmoisine (red), indigo carmine (blue), and guinea green. Chocolates are often coloured with a composite dye made from bismarck brown toned with a black and a green or blue.

With regard to jams, the ponceaus and carmoisine are largely used for raspberry, strawberry, and other red jams, and these may be toned down with tartrazine or orange I and II. Light green S.F. or guinea green are the chief apple-green colours.

In the case of custard powders, it is important to use very concentrated colours, and of these tartrazine is undoubtedly the best. Acid yellow G is sometimes used, but as this is reddened by fruit juices, and as custard powder is often used with fruits such as stewed apples, this colour is not very satisfactory. Orange I is also used.

The colouring of mineral waters presents very little difficulty, apart from the possibility of the colours settling out. Those chiefly used are tartrazine, ponceau, amaranth, and carmoisine. Orange tints can be obtained from acid orange G.G. or chrysoidine. As most mineral waters are acid the dye selected must be acid-proof. A great danger in colouring mineral water is excess of colour. One shudders at the thought of drinking the deep greenish yellow liquid often displayed in large glass containers under the name of still lemonade. Moderation should be exercised.

Colours for Margarine and Butter.

Formerly annatto was the chief colouring for butter, although carotin has had a somewhat limited use in this direction. Nowadays the oil-soluble azo dyes, such as butter yellow or yellow O.B., are largely replacing the natural colours. Annatto is unsuitable for margarine, as it tends to produce a pinkish colour. In colouring butter it should be remembered that acidity, owing to lactic or butyric acids, may develop, and only absolutely acid-fast dyes should be used. A useful test for the suitability of a dye for butter is to make a solution of the dye in oil at about the strength it will be used and to treat this with 10 per cent. sulphuric acid. If the lower layer shows any tendency to develop a pink colour on standing, the dye should be rejected. It is important also to use light-fast colours for butter. The chief butter colours are cerasine orange G., yellow O.B., yellow A.B., and butter yellow H.A.

Colouring of Ketchups, etc.

The dye most generally used for ketchups, curry, and mustard is turmeric. In the case of mustard the addition of colour is undoubtedly to cover up a fraud —notably the admixture of corn starch or gypsum. Cayenne and paprika are frequently coloured with oil-soluble dyes of the sudan class.

Dyes for Meat.

The practice of colouring meats is quite extensive. As sulphur dioxide is present as a preservative in most potted meats, it is necessary to use SO_2 fast colours such as ponceau, tartrazine, and amaranth. Ponceau is the best red for sausage meat, and it is frequently blended with tartrazine. For colouring polony skins benzo purpurine is chiefly used. Bury or black puddings were formerly coloured by boiling in soda, but now nigrosine is used instead. In brawn, bismarck brown and ponceau are largely used, but care must be taken to avoid bronzing in the jelly. It is not advisable to use oil-soluble colours, as these may bleed into the fat and give a streaky appearance.

Preparation and Storage of Solutions.

For the successful use of colours for foodstuffs great attention must be paid to the preparation and storage of the solutions. A little trouble in this direction is well worth while. In making up solutions it should be remembered that the maximum solubilities of dyes vary with different dyes. Some

are more soluble than others, but in any case no colours remain completely in solution above a concentration of 5 per cent., although the addition of glycerine helps in some cases. It is best not to store saturated solutions, but those slightly under saturated, to avoid any precipitation. When handling powdered dyes the danger of "flying" must be borne in mind. The writer has seen an operator carelessly emptying a packet of dye into a vessel and the whole of the room and the objects therein becoming speckled with the dye. In making a dye solution the best plan is to weigh out the amount required, to place this very carefully into a beaker, and then to make it into a paste with cold distilled water. The paste is gradually thinned and all lumps broken down. If some dyes are added to hot water they partially fuse and form sticky masses, which only dissolve with great difficulty, if at all. The paste is then made up to about two-thirds of the required volume with hot distilled water, and when all is dissolved the solution is filtered through filter-paper. The remaining third of the water is used for washing out the beaker and filter. The filtered solution is then allowed to cool and stand for about a week or ten days in a cold place, after which it is refiltered and put into the storage bottles. Solid dyes should never be used for obtaining homogeneous colouring effects; specks are always produced. The stock solutions should be carefully labelled and the strength and date of preparation indicated on the label. After a few months these solutions should be thrown away and fresh ones made, as they frequently deteriorate. Distilled water should always be used for aqueous solutions. Colours for margarine are made by pasting the dry colour with oil and then dissolving in a liquid oil in a steam-jacketed agitated fat-melting vessel. The oil solution is filtered through fine muslin.

Blending of Colours.

It is not necessary to keep a large number of stock solutions. If there are supplies of the primary colours available, any desired shade can be obtained by careful blending. For example, a red and a yellow will give all shades of orange, a blue and a yellow all shades of green, a blue and a red all shades of purple, etc. The trouble with many operators is the slipshod method of mixing—a bit of this and a drop or two of that, with just a dash of the other, eventually produces a desired shade, but one quite incapable of repetition. The various stock solutions should be stored in bottles or aspirators (about 2 litre capacity), and these should be fitted with self-filling burettes. When a blending operation is started the various burettes should be set at zero, so that when the desired shade is obtained a reading can be taken on each burette and an exact record kept of the component parts of the blend. Blends should be given a name or reference number, and these kept with the details of the preparation in a notebook. The best way of judging the shade is to stir well with a glass rod and then put a drop of the solution on to a sheet of white filter-paper. The nature of the substance to be coloured should be taken into consideration when making a blend.

Other Methods of Colouring.

In addition to adding dyes, there are other methods of colouring practised in the food industries.

It has been found that when ethylene is added to the air in which oranges and lemons are stored at a concentration as low as 1:5,000, any green colour in the peel is rapidly changed to yellow. This is not a chemical action, but a purely physiological effect; the rate of production of carbon dioxide is rapidly increased, and the general level of life activity in the tissues is stimulated. The same applies to apples and tomatoes.

The colour of meats produced in pickling is also interesting. It is now understood that the action of sodium nitrate in curing bacon, etc., is due to the reduction of the nitrate to nitrite by bacterial agency, and it has been found that the desired colour may be produced with certainty, in less time and at a lower cost, if sodium nitrite is used instead of the nitrate. The colour of uncooked cured meat is due to nitrosohœmoglobin, and that of cooked cured meats to nitrosohæmocromogen.

Fish Colours.

Artificial colouring matters have also been used for colouring fish, but complete satisfaction has not been arrived at, and a number of curers maintain that the artificial colours will have a limited application. Kippers are coloured by immersing the fish in brine to which the colour has been added. If the solubility of the dye is not good, there will be a deposit on the backs of the kippers and under the fins, which is undesirable. If brown dyes are used for this purpose, the solubility of the dye in brine must be carefully examined. Yellow dyes, such as fillet golden yellow or fillet lemon yellow, are used to colour fillets of fish. The dye is added to the brine, as in the case of kippers.

Flavourings.

In the case of flavourings, much the same principles as apply to colours are involved. Moderation and care must be exercised. Confectioners should remember that there are more flavours available than vanilla and lemon. Variety in flavour is just as essential as variety in colour. Most flavours are really tasted via the nose, and frequently smelling is the best method of judging. The chief flavours for confectionery are vanilla, lemon, almond, cinnamon, clove, ginger, allspice, orange, peppermint, and pineapple. Essential oils and esters are frequently used. If cakes are to be iced it is better to incorporate the flavour in the icing, so as to avoid its being baked out in the oven. Of the spices chiefly used for flavours, the most important are cloves, cinnamon, ginger, allspice, nutmeg, and mace. A recent development in spice flavourings is to use spice oil rather than the spices themselves. For flavouring pickling vinegar, about 10 to 15 minims of spice oils to 1 gallon gives a good result. The oil is rubbed in salt or sugar, so as to permit of a large surface to be exposed to the solvent action of the fluid. The whole is stirred well and stood for a few hours. For relishes 1 or 2 ounces of

spice oils are taken up on salt or sugar and mixed into a batch of 100 lbs.

For meat products the oil is applied by absorbing with pepper and salt in a mortar until a dry product is obtained. This is dusted over the meat before chopping. By the use of spice oils instead of spices a greater uniformity of quality, flavour, and colour is obtained, together with ease of handling and greater economy.

Imitation Fruit Flavours.

In many cases special fruit flavours are imparted to confections by adding the real fruits or their juices to the material to be flavoured; but it is not always possible to do this, as in some cases it is difficult to obtain an extract sufficiently concentrated to give the desired flavour, and hence has arisen the use of artificial fruit essence made from compound ethers mixed in varying proportions and combinations. These ethers are very pungent, and must be used in great moderation, as in excess they have a nauseating effect and produce a flavour quite unlike the fruit they are supposed to represent. Some of the artificial flavours are prepared, according to Leach, as follows:

1. Pineapple essence is made by dissolving butyric ether in alcohol. Butyric ether ($C_4H_7(C_2H_5)O_2$) is sparingly soluble in water.

2. Quince essence depends as a basis on ethyl pelargonate, sometimes called pelargonic or ænanthic ether ($C_2H_5C_9H_{17}O_2$) dissolved in alcohol.

3. Pear essence is an alcoholic solution of amyl acetate.

4. Banana essence is made up of a mixture of amyl acetate and butyric ether.

5. Apple essence consists of an alcoholic solution of amyl valerianate ($C_5H_{11}C_5H_9O_2$).

Of course, the confectioner can make up his own flavouring blends from a supply of essential oils, ethers, and esters if he desires to; but it is a delicate operation, which requires great skill, and one would strongly advise that he procures his essences made up by some well-known firm of essence makers. It will be found much more economical in the long run.

As would be expected, many flavourings are adulterated, and in the examination of commercial extracts the presence of adulterants must be looked for. The adulteration of vanilla extract consists mainly in the use of coumarin or extract of Tonka bean. Synthetic vanillin is sometimes substituted for the true extractive of the vanilla bean. Imitation vanilla flavours often consist of a mixture of either tincture of Tonka or coumarin with vanillin in weak alcohol coloured with caramel. Acetanilide has been used frequently as an adulterant, and this should be looked for carefully, as its presence is undesirable.

In the case of lemon extract citric and tartaric acids are frequently used with some turmeric or coal tar colour.

Almond oil is sometimes adulterated with nitrobenzene or oil of mirbane, but, of course, its detection is a very simple matter. To distinguish between artificial benzaldehyde and pure almond oil the ether extract is shaken with strong sulphuric acid. With natural oil of almonds a clear, brilliant, dark, currant-red colour is produced; with artificial benzaldehyde the acid produces a dirty brown colour and a precipitate.

Wintergreen extract is often adulterated with synthetic methylsalicylate; sometimes sweet birch oil is substituted.

The Legal Aspect.

Brief reference has been made to the Food and Drug Acts. The requirements of the law regarding colouring matters have been fully discussed in FOOD MANUFACTURE (June, 1928), and it is not proposed to enter into details here. It is sufficient to say that the law at present in England prohibits the use of picric acid, victoria yellow, Manchester yellow, aurantia, aurine, and gamboge. It also prohibits the addition to foods of any substance containing arsenic or other poisonous metals. Apart from these restrictions, a food manufacturer may use whatever colouring matter he chooses, but he would be wise to be guided in his choice by the manufacturers who specialise in guaranteed food colours. The writer has met with food manufacturers who have railed at the "restrictions" imposed by the Food Acts, declaring that they have been framed to worry the already worried manufacturer. This is not the case. They have been framed to safeguard, first the public, and secondly the manufacturer himself. If these dissatisfied people would only think of the events which led to these regulations they would cease their complainings. Many cases of death have occurred in the past owing to the indiscriminate use of colours. In 1860 Lankester described a dinner at which a green "blancmange" had been served. This had been coloured with copper arsenite, with a result that several people were poisoned and three died. Then there was the case at Clifton where several children were poisoned by eating very yellow bathbuns. The confectioner went to the druggist to get something to make the buns yellow, as if containing a lot of eggs. The druggist intended to give him chrome yellow, but in error gave him orpiment (arsenic sulphide), with disastrous results. Another interesting case was that of the man who was very ill on two occasions, on both of which he had partaken of Gloucester cheese. On analysis it was found to contain lead. The explanation was that the maker of the cheese had run out of annatto, and in order to colour the cheese obtained some vermilion. The person who sold him the vermilion had previously adulterated it with red lead! Colouring of tea was common. Alkaline carbonates and iron salts were added to give a fictitious appearance of strength, and green tea was coloured with prussian blue, indigo, and copper arsenite! It was in the manufacture of sweets that most of the poisonous colours were used, such as lead chromate, copper arsenite, copper carbonate, gamboge, vermilion, and prussian blue. Frequently children were poisoned in this way.

The days of using such objectionable colouring matters are fortunately over, and it is now possible to make confections look attractive in a harmless manner, and any food manufacturer is in a position to colour and flavour his goods in many ways without contravening any regulations or in any way injuring anyone's health.

Chocolate Egg Manufacture

By J. BOYD

Practical notes on the production of such seasonal specialities as chocolate Easter eggs and novelties.

THERE IS an astounding demand for such specialities as chocolate eggs at Easter time, the prices (retail) obtained for them ranging from the humble halfpenny to the more aristocratic guinea.

When making such eggs on a small scale, it is not essential to have a large outlay on moulds, etc., for with from two to five dozen assorted sized moulds, a fairly respectable trade can be carried out. The eggs are usually prepared well before Easter, decorated and packed in a cool place until they are required. To make them successfully it is necessary to have a good grade chocolate couverture, well-tinned moulds with a highly polished surface, and some experience in the tempering of the chocolate; the latter comes with time.

One feature about the handling of chocolate, especially in this connection, is the absence of that great bogie, waste, which is present with most manufacturing materials. Any moulded chocolate eggs that may get broken can be put back into the melting vessel again and so used up.

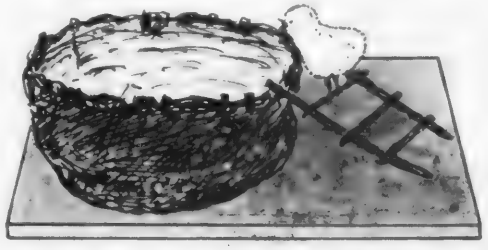
When using a good chocolate it is not necessary to add cocoa-butter for this work.

To prepare the couverture, place the broken block in a large clean cake tin and put into a hot press overnight. Temperature of this press should not be more than 80° F. and must be free from steam and dust. A most suitable place is in a disused prover directly under the oven.

On removing the chocolate from the press in the morning, it should be found to be liquid. The next step is to beat the contents of the cake tin with a clean, dry, wooden spatula until the mass again becomes set. It is not necessary to stand beating all the time; it should be done periodically while the other morning's duties are being carried on. When the chocolate has set or become tempered, it is put back in the prover for a few hours until it again becomes liquid. The beating is then repeated until the temperature of the chocolate is about 73° F. Experience will soon teach what temperature best suits the couverture being used. The temperature of the department in which the moulds are filled should be from 65° to 70° F. With the chocolate ready and the moulds polished, there are various methods which can be used for filling the moulds. Some fill the moulds right to the edge, allow them to rest till a shell of suitable thickness has formed on the mould, then turn the moulds upside down on a wire situated over a large receptacle to recover the chocolate that runs from the moulds, the wire containing the moulds then being removed to a cooler place till the eggs have become firm.

This method is very suitable where huge quantities are being prepared and every facility is on hand for speedy manipulating of the chocolate. For the chocolatier in the more modest type of business, best results may be obtained by spreading the chocolate on the inside of the moulds with a brush, so that a nice even layer of chocolate is distributed over the inside of the mould.

For quick setting the filled moulds should be placed where a cool draught of air may pass over and around them, and when ready the chocolate egg forms should leave the mould easily if pressed slightly on the sides. As with many other materials, chocolate expands as it becomes liquid and contracts as it solidifies. Should the eggs appear streaked with white when turned out, it is a sure indication either that the temperature of the chocolate was too warm or too cold, most probably the former, or that it was not beaten sufficiently with the spatula.



A Seasonal Chocolate Novelty.

To prepare the moulds for the next filling, heat them slightly and clean out with soft tissue-paper, polish well, then heat slightly again; this ensures that any damp likely to have been imparted to the mould by the paper will be eliminated.

The smaller eggs are usually sold just as shells, the larger variety being filled with chocolate creams or biscuits. When fixing the two halves together, have a hot tin at hand; hold the half-eggs on this just sufficiently long to soften the edges, then place together and hold thus till the chocolate edges set again. If the moulds have been neatly filled, the two halves should join nicely together without showing any unsightly broken edges.

Decorating the Eggs.

This may be done by using piping chocolate throughout as a medium.

To prepare chocolate for piping, add a few drops of water to a little of it, stir well, and use right away. The water and chocolate should be about the same temperature.

The higher-priced eggs are usually decorated with piping—*i.e.*, royal icing, a spray of flowers made

from this medium and elaborated with a few sprigs of fern, "Easter" being piped on the egg with royal icing, coloured to a yellow or pale coffee shade. When thoroughly dry, the eggs should be wrapped in transparent paper, to protect from dust and also to prevent the finished egg being marked in any way by fingers, the wrapping being fixed at the joins by attractive gilt seals.

Small Chocolate Eggs.

Those eggs, to sell at 1½d. or 2d. each, can be made without the aid of moulds. Work fine coconut into 1 lb. of fondant until you have a somewhat firm yet plastic material; divide into equal portions, either by the aid of a machine or simply breaking with the fingers, roll into ball form first, then into egg form, and as each egg is modelled fix a piece of stout wire in one end and place thus on a bed of fine coconut. Allow to dry overnight, and with a small brush dislodge any excess coconut that may be adhering to the eggs, dip in prepared chocolate, and run the wire end through the lid of a shallow cardboard box. When the eggs are set, the wires should be removed and the small aperture made by the wire filled in with liquid chocolate. Place the eggs in small chocolate-coloured paper cases, or wrap in tinfoil of various shades and pack in small cardboard boxes, which should have something representative of Easter portrayed on the lid.

Chocolate Novelty.

Spread prepared chocolate on a length of highly polished tin (the lid of a biscuit tin is very suitable for this purpose provided it has a well-polished surface), knock well on the slab to eliminate any air-holes that may be present, and when the chocolate is almost set place a piece of cardboard measuring 4 by 2½ inches on top of the chocolate, and cut around the edges right through the chocolate with a thin knife. When actually set, remove the oblongs from the tin lid, coat the surface of the chocolate slab with green-coloured royal icing; at one end place half a chocolate egg, and fill the inside of this with fine green paper shavings. From the edge of the egg and extending to the chocolate slab fix two lengths of chocolate, and across those lay stouter lengths to form a rustic ladder. On the topmost rung a small yellow woolly chick is perched, and a few small eggs may be placed inside the nest to help the effect, as shown in the accompanying illustration. Those novelties are sold at about 1s. 6d. each, or they may be placed on top of decorated Easter cakes.

The Demand for Biscuits in India

THROUGHOUT India the demand for biscuits is, comparatively speaking, greater than in any other country. Meat, butter, vegetables, eggs, and bread are not always obtainable, so that the white resident has often to fall back on biscuits, of which every local "godown" (storeroom) carries a plentiful supply, obtained through the medium of the dealers in the nearest bazaar. Naturally, in Calcutta, Bombay, Madras, and the large stations, where both European and native grocery stores, butchers, greengrocers, and dairies abound, one can live on the fat of the land, but the Englishman who is employed on railway construction, or in the remoter tea districts in the hills, has often to make biscuits a principal item of diet. Officials on tour and camping in the wilds for a night may shoot their supper and fish for their breakfast, but bread is unobtainable, so that biscuits again are in demand. Every administrator, therefore, takes good care to include several tins of them in his equipment before leaving his bungalow.

Some of the native officials, provided they are not affected by caste prejudices, include biscuits in their camp stores. Mohammedans are more or less free from restrictions in the matter of diet, but the same by no means applies to the orthodox Hindu, who will refuse biscuits, or any other imported food, which he thinks has been prepared by persons outside his own religion. The Hindu, however, who has received his education in this country is usually free from such qualms, and is quite willing to consume all the imported food he can afford. The native Christians are usually of the poorer classes, and thus are of little importance as potential consumers of imported foods.

During the past fifty years various attempts have been made to manufacture biscuits locally. Delhi, long famous as a wheat and flour producing centre, has upon several occasions found the necessary capital, imported British machinery and experts, and commenced operations. The product, however, failed to please the European customers, while the natives, resenting the presence of the English manager, also refused to buy the biscuits.

The shareholders of these concerns, who were mostly Hindus, replaced the European managers by members of their own race, who, it was thought, would not be affected by caste prejudices. From that point of view only, the employment of native managers was quite successful, but as the latter lacked the competence of their predecessors, each concern, sooner or later, came to grief. Some of the business men of Calcutta, Madras, and Bombay made similar experiments, but the biscuits produced did not somehow meet with the approval of the European residents. Attempts were made to develop an export business with Burma, Ceylon, Malaya, and China, but with no more success, while, as before, religious prejudices made them unacceptable for the native population.

To-day, the biscuit requirements of India are met by imported supplies, very large quantities arriving at the ports weekly. The market, however, is largely the preserve of a select few of the "home" manufacturers, to whose product generation after generation of dealers and customers have been accustomed. A number of French, Italian, and German firms have endeavoured to secure their footing, but, in general, their products have been of poor quality and their efforts unsuccessful.

GEORGE CECIL.

Publicity (*continued from page 79*).

fast rules can be laid down, as each production must vary in many ways according to the commodities it is selling. Some general observations are:

A cheap printer does not necessarily save money.

In choosing type, remember that not every business man wears horn-rims.

It is not essential to advertise yourself or your goods on the cover. There is plenty of room inside and ordinary curiosity will make your prospect look.

A booklet or folder can be cut to any shape.

Testimonials from purchasers are not the prologue, or the double page spread in the centre, they are the epilogue.

A good margin is never a waste.

Wherever and *whenever* possible use colour.

Publicity

By THE GRIFFIN

On Advertising Managers.

MANY FIRMS have on their staff an "advertising manager"; this is a sound proposition if the right man is selected, but at times it is painful to see the class of man who holds this position, even in large firms. I well recollect an important manufacturing concern in the Midlands who decided to put out an advertising campaign. It was a family affair in which Father was chairman and managing director, Son 1 was general manager, Son 2 works manager, Son 3 (who was not as bright as the others and therefore in no way allowed any responsibility) was promptly made "advertising manager," and what he said went. The campaign was beaten before it began.

An advertising manager to-day has got to have a good working knowledge of sales, copy, lay-out, blocks, type, and, most important, of media. In addition to this, his activities usually cover the production of catalogues, booklets, leaflets, folders, and so on, this leading to another branch of publicity that he must know—viz., colour printing. Exhibitions usually come within his province as well. It will be gathered, therefore, that an advertising manager is, or should be, a valuable man in that, with his specialised knowledge, he can save his employers a great deal of money as regards production of publicity matters, and he is also a distinct asset to the "sales" department.

He, in turn, must work smoothly with the agent. I have met some agents whose aim in life seems to be to get the advertising manager out of his job, and I have met advertising managers who have known this and who have, consequently, never settled down to their work. The agent's argument, "I am really your advertising manager, why keep another? Get rid of him and save his salary," I have heard many times, seen put into effect, and, within twelve months, have seen the agent lose the account through negligence. In the meantime, of course, the manufacturer has suffered badly. As a matter of fact, the advertising manager is the connecting link between "sales and agent," and he is in the position to see that the former give all the proper data and that the latter does his job. Personally, I have always welcomed co-operation by the advertising manager, well knowing that on any publicity campaign the more ideas there are the better the results.

In selecting an advertising manager, the manufacturer should not immediately jump to the conclusion that, because the applicant brings wonderful records of past successes and is perhaps in a good position, he must, of course, be the man to hold down your job. Remember the possibility that a man who has been extraordinarily successful in advertising boots and shoes may be an "also-ran" when it comes to plastic mouldings, grand pianos, or a campaign of "Tube *versus* Carton."

I recollect one very striking instance which will serve as a perfect example of how it should not be done. It concerns a well-known garden implement, and the company in question thought to save money by combining the posts of advertising manager and sales manager. They advertised for the former and finally engaged one of the latter on "his past successes" (note, but never retained by any of his successful companies). His salary was £1,000 a year. He knew nothing about advertising, left it to the agent, and devoted his time to sales. He had been advertising and sales manager for a chain of depôts and at once proceeded to put the same scheme into force for this company. At the end of two years the company had ten depôts (all losing money), the sales were stationary, but the over-heads of the advertising and sales departments had risen by nearly £3,000. He was on a contract for three years. The board closed the depôts, the managing director became advertising and sales manager, and the latter became an ordinary traveller till his contract expired.

Now a final word; do not expect one man to successfully fill two specialised jobs. Either of them is a one-man post if it is to be properly handled. If an

advertising manager is going to be engaged, get a good man and pay him well, but first be sure that he is good.

On Propaganda.

This covers sales letters, booklets, leaflets, folders, circulars, catalogues, showcards, cut-outs, Christmas diaries, calendars, advertising novelties, and so on.

Manufacturers as a whole spend vast sums on these matters, a great proportion of which is wasted, chiefly because these items are one-man products and are thought by the author to be "a great effort," "wonderful seller," "sure to fetch 'em," etc. Before any propaganda is finally decided on, it should be submitted to others for their criticisms, both destructive and constructive. Much can be learned in this way.

With regard to sales letters (or in high-brow terms direct mail campaign), it is remarkable what shoals of these (so-called) letters are sent out without any chance of achieving their object, usually because certain details have been overlooked.

Every manufacturer gets some of these letters in his daily post, and unless they happen to be well thought out and executed, their immediate destination is the W.P.B.

There are men who are considered past-masters in the art of concocting sales letters with marvellous pulling powers, culled from years of innumerable attempts and pieced together to form a grand finale. They marshal the selling points, set them out with underlinings, broken sentences, exclamations, and so on in long array.

The best sales letter of all, however, is the one that goes straight to the point, is pithy and arouses interest. In writing be natural, write as you would talk. Here are some hints:

Don't start by saying, "We understand you are interested," etc. Arouse his personal interest by saying, "You are, we think, likely to be interested in," etc. It makes all the difference.

Don't send letters done on a duplication machine because: (1) It is seldom properly inked all through the run; (2) it looks cheap; (3) the name and address bear a different type; (4) it carries a typed signature.

Don't address the letter to the firm, tuck the flap in and use halfpenny postage. 90 per cent. never reach the man they are addressed to.

Don't let some clerk scrawl his initials around the name of the firm. If there is not time during the day to sign them, take them home and do them in the evening. They are surely worth it.

Don't "shout" at your prospect. If you were in his office you would take your hat off. Well, do it, figurative speaking, here.

I have seen a splendid sales letter, fulfilling all the above details, and looking a certain winner, utterly and completely ruined because the sender was either ignorant, lazy, or incompetent to understand, for, instead of his personal signature, he had used a rubber stamp. He was asking a favour of a stranger and was yet too discourteous to sign his request.

A more or less popular name for sales letters is "the silent salesman." If a "talkie" is sent to a prospect the sender sees that he is presentable in every respect. (*Verb. sap.*)

With regard to booklets and folders, no hard and

(*Continued on page 77.*)

Correspondence

LITHOGRAPHED CANS AND PROCESSED PACKS

To the Editor.

DEAR SIR,

Mr. A. A. Maytham's letter in your February issue cannot be allowed to pass without reply.

His argument is that the use of lithographed containers for processed packs is impracticable and inadvisable, and among the reasons he gives for this statement are the (assumed) higher costs, the damage to the decoration during the making up processes, and the damage to the inks and lacquer during processing.

When this question was debated at the Canners' Convention at Leicester, I pointed out that the lithographing of cans for processing was done very extensively on the Continent, and I submit that English can and cap makers are equally capable of turning out as good an article, if not a better, should the home packers demand it.

All the difficulties Mr. Maytham enumerates are overcome by Italian, French, Scandinavian, and other Continental can makers, and although the finish may not always be equal to a highly glazed paper label, it is good enough to be very extensively employed. I should say that a paper labelled food tin is the exception rather than the rule on the Continent.

Of course, the finish varies considerably. I have seen lithographed cans quite equal to an English labelled can, and others very badly turned out.

The design plays a most important part in producing an artistic durable result. Heavy masses of ink and large expanses of white are avoided. Portions of the plain tin are cleverly utilised to obtain silver or gold in the colour scheme, when finally lacquered with gold or silver retorting lacquer, and the inks are often of artistic tints rather than mere opaque splashes of heavy pigment.

Until recently the inks supplied by the Continental makers were more suitable for retorting than those manufactured by English ink firms. The demand had produced the supply, and a much longer experience in this direction naturally placed the trade on the Continent ahead of us in England.

However, English ink and lacquer makers are now quite able to offer products equal to those used abroad, if they are called for by British packers.

I think I have proved by the above that Mr. Maytham's contention that lithographed cans for processed packs are impracticable is not correct, since they are, and have been for years, used on a large scale abroad.

The utmost that Mr. Maytham can assert with justice is that he does not think their use would be practicable in this country, and on this point I reply that the matter has not been tried. His argument as to cost is purely an assumption, and one that I trust a can-maker will deal with. As a purchaser of decorated tins, I do know that a decorated tin costs me no more than a plain tin and a label, frequently less, and it cuts out the substantial extra cost of labelling. Labelling is a substantial item of cost for small packages, apart from the slowing down of output involved. This fact obviously is appreciated by Continental packers of foodstuffs in tins.

If the British packers demand a lithographed tin, I am convinced that British can makers are capable of producing it at a worth while price, despite Mr. Maytham's somewhat pessimistic prognostications.

Yours faithfully,

A. LL. MATTHISON.

Enquiries

Enquiries are dealt with immediately on receipt, and the desired information is communicated in full by private letter. The replies given below are merely brief abstracts or indications that the names and addresses, or whatever may have been requested, have been supplied. Any further information supplied to us relating to the questions appearing below will be passed on to the enquirers.

107. *Names of firms manufacturing jam-making equipment.* (Ulverston.)

Names and addresses supplied.

108. *Where can full information on the manufacturing and bottling of fruit wines be obtained?* (Glasgow.)

The source of information supplied.

109. *Required an edible adhesive to stick the edges of cellophane tubes used as sausage casings and which will stand up to boiling.* (Glasgow.)

The correspondent was put in touch with the best advice on the subject.

170. *Particulars of plant for the making of potato crisps and the names of makers of such machinery.* (London.)

The enquirer was introduced to several firms interested in the matter.

171. *Please furnish us with the names and addresses of manufacturers of diabetic foodstuffs.* (Malta.)

Names and addresses supplied.

172. *We are interested in a modern textbook on the manufacture of sauces and pickles, and shall be obliged if you could indicate a most suitable medium and the publishers.* (London.)

We believe there is no book published which is devoted entirely to the modern manufacture of sauces and pickles. You will, however, find some information on this subject in the books by W. V. Cruess and C. H. Campbell.

173. *In the current issue of* FOOD MANUFACTURE *we find a reference made on page 59 to the packing of dried salt, pepper, and wet mustard in lead containers. There seems to be some difficulty owing to the lead being attacked and creating a certain amount of contamination. We are, as you know, one of the leading makers of stainless steels, and we think that such material may be useful for the containers referred to above. If your friends are interested in this matter we should be very pleased to have an opportunity of discussing the question with them.* (Sheffield.)

The parties interested in this matter were introduced.

174. *On page 186 of "Food Industries Manual" reference is made to Hansa Soya Flour. We shall be much obliged if you could give us any information regarding this product.* (Glasgow.)

This flour is, we understand, manufactured in Hamburg, and the sole distributors in this country are Fredk. Boehm, Ltd., from whom full particulars may be obtained. The distinguishing feature of Hansa Soya Flour is its freedom from fat. Another fat-free soya flour is Soyolk.

175. *In the manufacture of our ice-cream we are using dried eggs which are, unfortunately, imported from America under a special brand. Could you put us in touch with some English manufacturers?* (Birmingham.)

A number of suggestions were made in connection with this enquiry. It is questionable whether supplies of dried English eggs, or even dried Colonial eggs, are available. We are informed by the Assistant Trade and Produce Officer of New Zealand that, so far as he is aware, New Zealand has not this season a surplus of either fresh or dried eggs for export.

In this connection it is interesting to note that E. M. Lampert has published a paper in *Industrial and Engineering Chemistry* (Analytical Edition), April, 1930, p. 159, giving results of some investigations on the cholesterol contents of various forms of egg yolk—fresh, powder, frozen—and their relation to ice-cream making.

176. *Required names of firms marketing solid carbon dioxide in this country.* (Glasgow.)

Names supplied to enquirer.

177. *With reference to your article on solid carbon dioxide, I should be glad if you would put me in touch with some firm who would consider the manufacture of liquid CO_2 from gas evolved during the burning of limestone.* (Swansea.)

This was done.

178. *Kindly recommend us a competent analyst who would be able to make the analysis of lubricating oils.* (Belfast.)

A suitable analyst was recommended.

179. *Could you please supply us with the addresses of firms who manufacture machinery for making ice wafers and ice cups?* (Aberdare.)

Baker Perkins, Ltd., are, so far as we know, the only people who supply machinery for these purposes.

180. *With reference to your notice on standards for jam, please furnish us with the address of the Jam Section of the Food Manufactures Federation.* (Lisbuern.)

The address was supplied.

181. *Nous vous serions reconnaissants si vous pouviez nous donner des précisions au sujet du colorant vert mentionné à la page 246 du Manual, qui semble donner de si bons résultats.* (Paris.)

Referred the enquirer to the Campden Research Station.

182. *We are interested in the manufacture of piping jelly and would be pleased if you could supply us with a formula.* (Newcastle-on-Tyne.)

The correspondent was put in touch with an expert on the subject and referred to an article which will appear shortly in FOOD MANUFACTURE giving full particulars.

183. *We are asked by a firm of food manufacturers to quote them for a machine, probably gas heated, to dry and simultaneously agitate about 28 lbs. of powdered foodstuffs. Also they require a mixing and sifting machine for drying powders, in about the same capacity and also double.* (London.)

The names of suitable firms were furnished.

184. *Reference to original paper on Transparent Emulsions of Some Essential Oils required.* (Mitcham.)

This was supplied.

185. *References required to literature published before 1912 dealing with the making of jams and jellies and with apple juice and pectin.* (Kansas City.)

We understand that Mr. C——, of New York, has an excellent bibliography on pectin, dating as far back as the days of Fremy. Also, an exhaustive bibliography of pectin manufacture and jelly making in America was published in *The Fruit Products Journal* for January 19, 1931.

186. *What is the evidence for or against the use of sulphur dioxide as a food preservative? Several American States do not permit it, and it is, of course, only permitted in certain instances in England. Where could a report of the Preservatives in Food Committee be obtained?* (Baltimore.)

We believe you will find what you want in the *Report of the Select Committee on Preservatives and Colouring Matters in Food*, printed and published by H.M. Stationery Office, London. Unfortunately, this publication is out of print, and is extremely difficult to obtain even in this country. The enquirer was put in touch with a specialist on this subject who will be pleased to supply a copy of extracts of interest and also any further information and advice.

187. *We should be glad to have the names and addresses of any firms who manufacture electrically driven dish-washing machinery, to be used in a club.* (London.)

Names supplied.

188. *Could you put us in touch with the manufacturers of ice-cream mixing machines?* (Castlemahon.)

Suitable names were supplied.

189. *We should be glad if you could inform us whether you know of any machines for measuring colourings, flavourings, etc., for use in the food industry.* (London.)

We have not heard of such a machine which can be used conveniently. The usual methods are described in Fairbrother's article published on another page of the present issue. The chief difficulty which would be experienced in using a machine would be that one machine would have to be used for each particular colour or else very thorough washing would have to be carried out when a change is made from one colour to another.

190. *Fresh tomatoes are cooked in vacuum pans to adequate specific gravity, passed through a finisher, packed while boiling hot into bottles, and then adequately sterilised. Upon storage for three or four weeks, the material in the larger bottles separates into pulp and a lower layer of juice; it also gives a poor blotting-paper test. This trouble was not experienced in the earlier days when the open pan, high-temperature method of cooking was in vogue. In all other respects the sauce is perfect.*

Another difficulty is the difficulty of getting the sauce, when in domestic use, to start flowing without thumping the base of the upturned bottle. (New Zealand.)

The tendency of tomato ketchup to show an uneven texture and to separate out into pulp and juice seems to depend largely on the amount of pectins present. The pectins are only slightly soluble in cold water or juice, but on heating there is a very much more complete extraction. This explains how it is that the hot-pulping (or "hot-cycloning") method gives ketchups with higher viscosities, smoother textures, and greater separation resisting properties than those prepared from cold-pulped tomatoes. The latter give broad seepage rings; the former should show little, if any, seepage stain by the blotter test. In the cold-pulping process the fruit is not heated previous to pulping and this is done in the cold. In the hot-pulping process the whole tomatoes may be cooked with live steam until they soften and break down, or the tomatoes may be mechanically crushed before they are cooked.

Of course, one has to contend with the variable pectin contents of tomatoes, and it is sometimes recommended to add small amounts of fruit pectin to increase the viscosity and separation resisting properties of ketchup, to the extent of, say, 0·1 to 0·4 per cent. of the weight of the ketchup, depending upon the nature of the pulp, the added sugar content, and the method of manufacture. The above properties may be increased also by raising either the sugar or the tomato solids content. The sugar emphasises the physical properties of the natural pectins present and the tomato solids increase the total amount of these pectins and also the amount of fibrous material; but there are obviously limitations to the extent to which these increasements may be made.

It should be noted that specific gravity is no criterion of viscosity or separation resisting properties.

Once the correct viscosity is secured and the tendency to separation overcome, there will be no difficulty in pouring the sauce from the bottle.

191. *Advice is required on the subject of potassium bromate as a bread improver.* (Burton-on-Trent.)

Potassium bromate is a very powerful bread improver, even so small an amount as one-tenth of an ounce per sack having a marked influence. The use of potassium bromate is, we believe, covered by patents, and it would be advisable for you to make further enquiries in this connection. According to Fairbrother (*Food Industries Manual*, p. 178, 1931), the principal improvers besides potassium bromate are persulphates (trade name, Salox), acid calcium phosphate (Ibex), chlorine (Beta Gas), and nitrogen trichloride (Agene). Aluminium persulphate, about ½ oz. per sack, is one of the most popular, while acid calcium phosphate, at the rate of 8 ozs. per 280 lbs. of flour, is a useful agent.

192. *What action is pineapple juice likely to have on copper or iron plant? It is desired to avoid any blackening of the juice. Would aluminium alloys, nickel, or stainless steel be more suitable?* (Jamaica.)

Most fruit juices, pineapple included, will dissolve sufficient copper to give black discoloration and a metallic flavour. Steam pans for this purpose should be heavily silvered, or else of stainless iron. A glass enamel lining would probably be very suitable. Aluminium has a good resistance to cold fruit juices, but with many fruits this resistance decreases with increased temperatures.

Canning and Agriculture

On *December* 18 last year an interesting address was given by W. W. Homan, of British Canners, Ltd., to the Ipswich Rotarians. The guests included a number of agriculturists. Mr. Homan stated that out of all the depressing facts of world trade, one optimistic note could be sounded. There emerged at the present time the greatest opportunity for a most interesting readjustment of what had been the most serious maladjustment in our economic system—the ratio of agricultural to industrial prices. Land and its products were vital factors in any economic order. Full advantage had not been taken in this great factor of production; conservative traditions in land tenure, methods of cultivation, and, above all, marketing, all played their part. "*Agriculture to-day must be industrialised,*" he declared; science and mechanical skill must be harnessed to nature to get the utmost from the soil and its distribution to the consumer in the most suitable form. Marketing presented the greatest problems, and, at the same time, the greatest hope. Perishability was the hardest of the conditions the farmer had to face, but, with the aid of industrial enterprise, a solution to this was at hand. Produce could be preserved until there was a market for it, and preserved in a form that lost none of its food value. Such were the possibilities with fruit and vegetables that were suitable for canning.

The whole object of the canning industry, said the speaker, was indissolubly linked to the interests of the growers. England had been behind in grasping this important factor Days of old-fashioned individualistic competition were gone. Considering the advantages to the growers—and he was delighted to know there were so many there—the speaker said the canners could provide them with a steady outlet, and steady prices for the right produce, absorbing some of the surplus in times of glut. They could also increase the demand for the produce, so employing more men and machines. There was tremendous possibility in the export field. Methods of British canning had improved enormously, and in this direction he spoke of the improved double lacquered containers now in use. Then there was the National Mark. Improvements were afoot to standardise containers. The British canners were ready to do business with growers who got together as a body, and were willing to sink their own personal identity in a centralised pooling and markets for their resources, and were thus able to accept long-period contracts for the supply of first-class fruit and vegetables. Growers must form local combines large enough to handle important contracts of sufficient permanence to justify building a cannery for the purpose of dealing with the products of their orchards and fields. This meant nothing more than the acceptance of the general principle of co-operative effort, vital to the future of British agriculture.

Food Exhibits at the British Industries Fair

MANUFACTURERS ENGAGED in the food and kindred industries were well represented at the British Industries Fair, which closed on the 27th ult. At the London section, the recently constructed extensions to Olympia were available for the first time, and exhibitors were thus able, in many cases, to obtain greater space for the accommodation of their displays.

Messrs. A. Boake, Roberts and Co., Ltd., occupied stands Nos. B102 and 105 with a display of approximately 700 of their fine and technical chemicals. A special feature was made of flavouring essences, food colours and preservatives for mineral waters, confectionery, jams, sauces, etc., all of which were guaranteed to conform to the Sale of Food and Drugs Act, Public Health Regulations, 1925, and all others in force in this country.

On the British Can Company's stand in the Empire Hall were a complete range of the firm's products, all artistically decorated and displayed on a revolving pyramid eight feet high in order that the whole of the products should be visible from one position. The sizes displayed ranged from cans 9″ × 4″ × 13″ to those less than 2″ × 2″.

The Corrugated Packing Materials Co., Ltd., made a special feature of packings for coffee essences, sauces, and pickles; jam crates for 24 1-lb. or 12 2-lb. packages, with an insurance against all breakage of the contents in transit. A seasonal exhibit was a display of a patented type of box for the packing of the larger sizes of Easter eggs. Gummed paper tapes and waterproof papers of varied types were also on view, as well as greaseproof corrugated packing of the type which is used so extensively by biscuit manufacturers.

The B.T.H. stand at Birmingham, which was devoted to the well-known "Mazda" lamps, was of very unusual design; apart from the distinctive nature of the counters, which consisted of two converging lines of triangular sections of diminishing size, the material of which they were made was also novel. These counters were illuminated from within, and it was at first proposed to make them of glass, which has many disadvantages. Subsequently it was decided to use a new translucent material which gives the effect of glass without the fragility.

The Metal Box Company, Ltd., on stand 176 in the Grand Hall, had a very comprehensive range of decorated and plain tin boxes and containers suitable for use by all classes of manufacturers, including packers' cans for food preserving, decorated boxes for confectionery, tobacco, cigarettes, biscuits, patent foods, toilet preparations, etc. This exhibit is a collection of the manufactures of the associated companies forming The Metal Box Co., Ltd., of Queen's House, Kingsway, London, W.C. 2. This company includes in its associates such well-known houses as Hudson Scott and Sons, Ltd., of Carlisle; G. H. Williamson and Sons, Ltd., Worcester; Barclay and Fry, Ltd., London; F. Atkins and Co., Ltd., Hull; E. C. Barlow and Sons, Ltd., London; I. A. Hodgson and Co., Ltd., Newcastle; British Sure Seal Co., Ltd., London; H. Grant, Boutle and Co., Ltd., London; E. T. Gee and Sons, Ltd., Aintree; and the Excel Canister Co., Ltd., London.

The stand itself was a good example of the display artists' craft, consisting of bright metal work, colours, and lighting. The feature of the display was a bent plate glass column forming a showcase.

Among Birmingham exhibitors of food interest were Messrs. Arthur Holder and Sons, Ltd. Their stand was designed to show the wide variety of products which this firm manufactures. There was a noteworthy selection of decorated tin boxes, the work of all the best-known tin printers in the country. The finishes obtained with the firm's copal stoving varnishes, copal matts, coloured coatings, and gold varnishes were very striking.

On the food canning side, specimens were shown treated with the firm's well-known Zinnatine specialities, while as regards the general industrial trade in which this firm also specialises, there were pleasing examples of work in Holdenoid cellulose lacquers, black and coloured stoving and air drying enamels for the pottery, automatic machine, hollow-ware, conduit, bedstead, toy, and numerous other trades.

Screw-cap, all-paper containers of many types were displayed by Packs (1925), Ltd., on their stand at Olympia. Many of the containers were shown containing the very products for which they were intended. Particular attention was drawn to the very attractive multi-colour printing effects which could be embodied in the cartons. On this stand was also the new method of milk distribution in paper "Milpacks." There was on view a large power machine which was capable of filling and closing these "Milpacks" at the rate of 1,000 pints per hour, and also a small hand machine which could close at the rate of 400 pints per hour.

The well-known "Red Ball" brand of essences and flavours were exhibited by Messrs. Stevenson and Howell, Ltd., on their stand. Among the trades for which the firm cater in the production of essences, and for which suitable types were shown, are aerated water manufacturers, confectionery (hard and soft), distillers and liqueur manufacturers, biscuit manufacturers, and food manufacturing industries generally.

Messrs. G. and A. Harvey were also among the Birmingham exhibitors. Among the items specially relating to food production among their general display of metal work were specimens of very varied industrial equipment. In view of the progress that is being made in this country in the canning industry, the exhibit of a vertical processing retort on this stand was of particular interest. The specially constructed swing bolts and perforated baskets were claimed to offer many advantages for easy, safe, and rapid operation. Messrs. G. and A. Harvey and Co. (London), Ltd., manufacture all kinds of apparatus for use in food manufacture, including horizontal processing retorts, can and bottle crates, cooling tanks, sterilisers, jacketed pans, washers, vacuum drying and evaporating pans.

(To be concluded.)

Trade News

Irish Trade Mark Registration.

It is probably not generally known by manufacturers and traders that goods bearing only a British Registered Trade Mark or Design may not be traded with in the Irish Free State under a penalty of £5. This means that the Trade Mark or Design must be also registered in the Irish Free State before it can be safely dealt in, and a friendly warning has been given by the Comptroller on this point before taking definite steps to stop infringement under the Irish Act. Full information may be obtained free from Messrs. Rayner and Co., Regd. Patent Agents, 5, Chancery Lane, London, W.C. 2, who advise our readers on these subjects.

* * *

Manchurian Soy Bean Situation.

The 1930 soy bean crop of North Manchuria is being estimated by some authorities at from 20 to 25 per cent. larger than last year, according to reports from Shanghai. This would represent a crop of approximately 5,000,000 tons as compared with 4,000,000 tons last year. The quality of the crop will be excellent. This estimate is probably too high, but it is certain that the crop will be greater than last year. Stocks of old crop beans are placed at 100,000 tons, which is not particularly excessive. The export demand at present is very weak, and firms are only buying about 50 per cent. of their usual quantities. The bean oil market is especially quiet, and mills are buying only 10 to 15 per cent. of normal amounts for that purpose. Local prices, in spite of the exchange rate, are lower than at any time since the war.

* * *

"To Testimonials—£5,000."

If an article which recently appeared in our New York contemporary, *Advertising and Selling*, is correct, the above heading must appear fairly frequently in the accounts of American advertisers. The article is entitled "The Inside of the Testimonial Racket," and the writer—who is a woman—states that she has been employed "in over twenty-five different testimonial campaigns. The endorsers included women of title, athletes, authors, political leaders, members of 'first families,' artists, and people in the theatrical profession."

* * *

Apparently, most testimonials are secured by a "liaison officer," and not by the manufacturers themselves; in the writer's own words: "Advertisers realise that people of note can be approached much more easily (and cheaply!) if it is done through the right *entrée*. For instance, Jack Dempsey, if asked out of a clear sky to endorse a chewing-gum, would probably hold out for a sum twice as large as if he were approached for the same thing by a personal friend. Then, again, people who are not keen about publicity (oh yes, there are still a few left) are more likely to capitulate if they understand that their friend who is asking for the testimonial is going to profit thereby."

* * *

The average amount paid per testimonial varies, of course, with the prominence of the individual giving it, ranging from a hundred or so dollars up to $10,000 and even more. The testimonial getter is usually given about half the amount paid the celebrity. "Faking" appears to be common; one celebrity, it is admitted, was persuaded to give a testimonial for a breakfast food which actually he detested, while "a woman well known in social and political circles endorsed a product for me which, up to the time she tested it, was a stranger in her household. She wasn't averse to the article—the only fake was the wording of her endorsement, which gave the impression she had used it for years. But she needed $1,500, so did not object to this slight distortion."

* * *

Canned Goods in Denmark.

The Danish demand for canned vegetables during the past season was chiefly supplied by the domestic industry, while in the case of canned fruit the bulk was of foreign origin, notwithstanding the high import duty, which naturally tends in a measure to restrict the importation, according to information contained in a report by the Acting Commercial Attaché at Copenhagen. The past year's crop of both vegetables and fruits in Denmark has been of record proportions. The apple and the various berry crops have been exceptionally good, whereas the pear crop has been relatively small. Both the quantity and the quality of vegetables and fruits are reported excellent, due in a measure to favourable weather and to the fact that the domestic cultivation, especially of fruit, in late years has been improved and modernised.

* * *

Canned Vegetable Imports Decline.

Imports of canned vegetables have continued to decline during the past few years, owing to the increasing importance of the domestic industry. Imports of canned vegetables during the first six months of the current year aggregated 166,227 pounds, valued at approximately £23,490, compared with 177,911 pounds, valued at about £23,803, during the same period of 1929.

The foreign orders for canned vegetables were placed chiefly with the United States, and such European countries as Belgium, France, Italy, Great Britain, and Germany.

* * *

Increase in Canned Fruit Imports.

In the case of canned fruit, however, a steady increase in the importation has taken place during late years, especially with such varieties as peaches, apricots, and pineapples, which are not grown in Denmark. During the first six months of last year imports of canned fruits totalled 833,118 pounds, valued at about £19,000, compared with 786,601 pounds, valued at £18,000 during 1929.

The United States has continued to rank as the most important of the foreign suppliers of canned fruit to the Danish market, while the most important of the European countries are Italy, Great Britain, and Germany. Imports of canned fruit, however, are hampered to a considerable extent by the high import duty, amounting to 1 crown per kilo (approximately 6¾d. per pound), which naturally tends to make canned fruits considered as more or less of a luxury by Danish consumers.

* * *

The International Dairy Congress, 1931.

The ninth International Dairy Congress will be held on July 14 to 17, 1931, at the Houses of Parliament, Christiansborg, Copenhagen, by the International Dairy Federation. This Federation was established in Brussels in 1903, and congresses have been held in Brussels (1903), Paris (1905), Hague (1907), Budapest (1909), Stockholm (1911), Bern (1914), Paris (1926), and London (1928).

The object of the Federation is to secure the co-operation of the dairy organisations in all countries in promoting the technical and scientific development of the dairy industry throughout the world.

Anybody wishing to participate in the Congress may become a member by applying in writing to the organising secretary, Bülowsvej 13, Copenhagen, V. Applications should be sent in before May 1, 1931, together with the subscription D.Kr. 25.—. Associations, dairies, and institutions connected with the dairy industry may become members and send delegates to the Congress. There will be five Congress sections: (1) Dairy cattle breeding and milk production; (2) chemistry, bacteriology, and hygiene; (3) technique, industry, and trade; (4) organisation, legislation, and control; (5) topical dairy industry. There will be various excursions to institutions, etc., in and near Copenhagen.

Book Reviews

Canning Fruits and Vegetables. By Edith Elliot. Pamphlet No. 109. Fruit Branch, Department of Agriculture, Canada. Pp. 13. Ottawa, 1929.

Gives directions on the domestic canning of Canadian fruits and vegetables. Sectional headings are: How Canning Preserves Food; Equipment; Processes; Storing; Time-Table for Fruits.

Notes on the Carbolic Taint in Sterilised Milk. By E. R. Hiscox, M.Sc., National Institute for Research in Dairying, University of Reading. Reprinted from *The Dairyman,* December, 1930.

The most troublesome of "taints" to which sterilised milk is susceptible is variously described as "coconut," "smoky," and "carbolic," an outbreak of which rapidly develops into an epidemic if steps are not immediately taken to keep it within bounds. Investigations by the N.I.R.D. have shown that the taint is caused by certain bacteria, which bring about characteristic chemical changes in the constituents of the milk—traces of cresolic substances are developed, as well as the formation of lactic acid. These bacteria produce spores difficult to destroy. The author advises thorough sterilisation of the bottles before filling, and the same applies to bottle-washing machines.

The Viability of "B. Tuberculosis" ("Bovinus") on Pasture Land, in Stored Fæces, and in Liquid Manure. By R. Stenhouse Williams and W. A. Hoy. National Institute for Research in Dairying, University of Reading. Reprinted from *The Journal of Hygiene,* vol. xxx., No. 4, November 14, 1930.

The object of experiments described in this paper was to determine the length of time during which *B. tuberculosis* in cow's fæces remain alive and virulent on pasture land in the South of England.

Grain Drying in a Country Elevator. By W. M. Hurst and R. H. Black. Circular No. 127. U.S. Department of Agriculture, August, 1930. Pp. 14.

The subject is discussed under the following headings: Moisture Content of Grain; Need of Grain Dryers; Description of a Commercial Dryer; Operation of Dryer; Moisture, Test Weight, and Dockage Determinations; Increase in Market Value.

Wheat Studies of the Food Research Institute. The Changing World Wheat Situation. A Statistical Appraisal in Terms of Averages, Trends, and Fluctuations. Vol. vi., No. 10, September, 1930. Stanford University, California.

The geographical distribution of the world's wheat production and trade is continually changing. In the present study a primarily statistical and graphical description of the general situation, based on the most recent data, is presented.

In the changes from year to year in the international wheat situation, the various countries of the world play quite different parts. The changing surpluses from Canada, Argentina, Australia, and from some minor exporters are forced on the international market almost without regard to price. Half of the usually large United States surplus may either be exported or withheld, depending chiefly on the export price. Indian and Danubian exports also depend on price. Among the major importers, only Great Britain, Germany (prior to the war), the Netherlands, and perhaps Belgium appear commonly to adjust reserves so that fluctuations in the size of their own crops and part of the fluctuations in international supplies are absorbed. Italy, France, and Spain make no measurable adjustment either of domestic consumption or of year-end stocks to the international supply situation, but absorb part of the fluctuations in their domestic crops.

From the review of characteristics of year-to-year fluctuations in the various elements in the international wheat situation, it appears that certain new developments tend to promote wide fluctuations in prices from year to year. It appears also that the autumn of 1930 finds the ability and disposition to withhold or to accumulate surplus stocks, essential to the prevention of abnormal price depression when supplies are above current requirements, weakened or absent to an extraordinary degree.

A Method for Testing for Ropiness of Bread. By H. H. Bunzell and Marion Forbes. Bunzell Laboratories of N.Y.C. and the Woman's Medical College of Pennsylvania. Reprinted from *Cereal Chemistry,* Vol. VII, No. 5, pp. 465-472. 1930.

Rope is an infection of bread by an organism *B. mesentericus,* whose spores survive baking temperature. The authors have done considerable work for the last ten years on the conditions and control of the disease, and have developed a method for determining the extent to which active rope organisms are present in bread. They state that while scrupulous cleanliness, disinfection, and thorough removal of all infected material from the plant is helpful, the only positive and immediate remedy seems to be the use of acids. Vinegar, lactic acid, a mixture of the two, or calcium acid phosphate are the favourite means of creating in the dough a degree of acidity incompatible with the growth of the organism. A dough with a *p*H between 4·5 and 5·0 appears to be safe.

Index to the Literature of Food Investigation. Compiled by Agnes Elisabeth Glennie, B.Sc. Vol. II., No. 2, September, 1930. Pp. 89. Department of Scientific and Industrial Research. London. H.M. Stationery Office. 2s.

Abstracts of the chief articles relating to foodstuffs which have appeared in all relevant periodicals. This is really a monumental work and is of the greatest service to research workers, industrial chemists, and others associated with the technical development of food industries. Patent specifications are included. The matter is grouped into fifteen sections—such as meat, fish, dairy produce, bacteriology—and each of these is subdivided under useful headings. This is the fourth index which has been issued, the first having been published in March, 1929.

Studies on the Coccaceæ.—XVI. The Genus *Leuconostoc.* By G. J. Hucker and Carl S. Pederson. *Technical Bulletin,* No. 167, July, 1930. Pp. 80. New York State Agricultural Experiment Station.

A biochemical study has been made of eighty strains, and a survey of eighty-six additional strains of low acid producing types of streptococci (*Leuconostoc*). These cultures were isolated from slimy sugar solutions, from fermenting vegetables, and from milk and milk products.

A survey of the earlier work pertaining to these organisms indicates that investigators studying fermenting vegetables, including sauerkraut, pickles, tomato products, etc; those working with milk and milk products, such as starters, organisms from ripening cheese, etc.; and those studying organisms from sugar factories, have been dealing with organisms which are identical or closely related. These organisms belong in one genus.

A study of a series of cultures has shown that they all produce approximately 45 per cent. lævo-lactic acid from glucose, 20 per cent. carbon dioxide, and 25 per cent. volatile pro-

(*Continued on page* 89.)

Financial News

The Editor cannot accept responsibility for any errors which may appear in the Financial News Section

BANK RATE (1930)

February 6	4½ per cent
March 6	4 ,, ,,
March 20	3½ ,, ,,
May 1	3 ,, ,,

The general decline in prices is reflected in a sharp falling off in the earnings of many concerns engaged in the food industry, and in the case of **Liebig's Extract of Meat Co., Ltd.**, a reduction of profit from £371,126 in 1928-1929 to £301,442 for the twelve months ended August 31 last is reported. Together with other income, the gross profit on trading amounted to £386,098, but income-tax took £66,057, which was only £3,627 less than the decrease in net profit. The appropriation figures are given below :

	£	£
Brought forward from 1928-1929 ...	256,949	
Net Profit—year ended August 31, 1930	301,442	
Disposable Balance	£558,391	
5% dividend on £1,000,000 Cumulative Preference £5 Shares		50,000
14% dividend on £2,000,000 Ordinary £5 Shares		280,000
Carried forward to 1930-1931		228,391
		£558,391

In the previous account the sum of £4,912 was absorbed in interest on 5½ per cent. notes, but as the notes were repaid in November, 1928, there is no charge under this heading in the present account. Some of the principal items appearing on the company's balance sheet are tabulated below :

	Aug. 31, 1930. £
Reserve Fund	1,650,000
Lands, Factories, Buildings, etc.	510,268
Stock of Produce, Livestock, etc.	3,414,160
Investments in Subsidiaries	1,411,273
Due by Subsidiaries	620,683
Debtors	200,435
Cash	199,047
Bank Advances, Creditors, etc.	614,620
Bills Payable	610,000

At the recent price of 11 the ordinary shares return 6¼ per cent., while the preference shares are quoted around par.

The profit and loss account of **J. and E. Hall, Ltd.**, manufacturers of refrigerating machinery and plant for the collection, compression, and purification of CO_2 gas, for the twelve months ended September 30 last discloses a substantial decline in the balance of net profit, the figure being £30,793 as compared with £60,379 the previous year. The company was registered in 1900, and in 1919 additional ordinary shares were created, the authorised capital being £800,000, of which £710,000 has been subscribed and called up in the form of £150,000 6 per cent. cumulative preference £5 shares and £560,000 ordinary £1 shares. The ordinary dividend has been reduced from 8½ per cent. to 5 per cent., the final figures being balanced as follows :

	£	£
Brought forward from 1928-1929 ...	9,676	
Net Profit—year ended September 30, 1930	30,793	
Disposable Balance	£40,469	
6% dividend on £150,000 Cumulative Preference £5 Shares		9,000
5% dividend on £560,000 Ordinary £1 Shares ...		28,000
Carried forward to 1930-1931		3,469
		£40,469

The following are some of the main balance sheet items :

	Sept. 30, 1930. £
Reserve	250,000
Properties	196,278
Plant, etc.	154,328
Stock	224,676
Investments in British and Colonial Government and Municipal Securities	166,625
Shares in Other Companies	8,133
Cash	136,530
Debentures and Sums due by Subsidiary Companies	35,880
Debtors	157,718
Creditors	129,900

As compared with a working profit of £293,618 in 1928-1929, a profit of £210,061 was realised by the **Rio de Janeiro Flour Mills and Granaries, Ltd.**, during the twelve months ended September 30 last, and the balance of net profit declined from £204,549 to £113,883. These results are due to the unfavourable trading conditions and financial dislocation in Brazil, aggravated by acute competition, and, although the dividend of 15 per cent. is being maintained, the distribution is less tax and not tax free as last time. The sum of £42,000 was transferred from contingency reserves, and the amount carried forward is less than a year ago. The following is a summary of the company's appropriation account :

	£	£
Brought forward from 1928-1929 ...	88,380	
Net Profit—year ended September 30, 1930	113,883	
Transferred from Contingency Reserves	42,000	
Disposable Balance	£244,263	
15% dividend on £1,364,838 Shares of £1, less tax		158,662
Carried forward to 1930-1931		85,601
		£244,263

The shares were recently quoted at 34s. 3d.

The reduced purchasing power of the Canadian farmer is reflected in the accounts of the **Cockshutt Plow Co., Ltd.**, covering the twelve months ended November 30 last, the balance of net profit being only $317,244 as compared with a net profit of $949,656 for the eleven months ended November 30, 1929. The company was incorporated in 1911 under letters patent of the Dominion of Canada, and other interests have since been acquired, the authorised share capital being 500,000 shares of no par value, of which 288,600 have been allotted and credited as fully paid. Although the net earnings were equal to only $1·09 per share, a dividend of $1·50 per share is being paid, the final figures being made up as follows :

	$	$
Brought forward from 1928-1929 ...	1,004,899	
Net Profit—year ended November 30, 1930	317,244	
Disposable Balance	$1,322,143	
Dividend of $1·50 per share on 288,600 shares (n.p.v.)		432,900
Allocated to Bad and Doubtful Debts Reserve ...		150,000
Carried forward to 1930-1931		739,243
		$1,322,143

The current liabilities total $1,491,302, but against these are current assets totalling $7,747,403.

Tightness of money in Australia, in conjunction with low prices, is responsible for the loss sustained by the **Australian**

Pastoral Co., Ltd., which was registered in 1888 and owns estates and stock in Queensland and New South Wales. The loss for the twelve months ended June 30 last amounted to £8,162, and after deducting from this figure the credit balance of £6,272 which was brought forward from the previous year's account, the debit balance was £1,890. By transferring £2,500 from reserve, the sum of £610 is being carried forward to 1930-1931, the reserve now showing a balance of £440,000, apart from £40,000 standing to the credit of a reserve earmarked for stock losses. Some of the main items enumerated in the final accounts are given below :

	June 30, 1930.
	£
Gross Earnings	128,615
Expenses	136,977
Bills Payable	30,000
Creditors	13,212
Deposited by Subsidiary	34,829
Cash	17,170
Debtors	871
Wool	47,540
Investments	546,563
Consolidated Stock	1,000,000

The stock was recently quoted at 67.

The accounts of **Fortnum and Mason, Ltd.,** grocers, wine merchants, etc., covering the twelve months ended August 31 last, show further progress, the balance of net profit for the year being £72,444 as compared with a net profit of £70,446 in 1928-1929 and £52,670 for the previous year. The company was registered in 1905, the authorised share capital being £350,000, of which £335,000 has now been issued and paid up, comprising £125,000 7 per cent. preference shares and £210,000 ordinary shares, each of £1 denomination. The dividend on the ordinary capital has been raised from 22 per cent. to 23 per cent., and an increased amount carried forward, the final figures being balanced as follows :

	£	£
Brought forward from 1928-1929	21,497	
Net Profit—year ended August 31, 1930	72,444	
Disposable Balance		£93,941
7% dividend on £125,000 Preference £1 Shares		8,750
23% dividend on £210,000 Ordinary £1 Shares		48,300
Transferred to Reserves		6,793
Allocated to Staff Fund		1,612
Carried forward to 1930-1931		28,486
		£93,941

The company's reserve fund has been brought up to £365,000, and goodwill has been eliminated.

Trading conditions in the box-making trade have been extremely difficult during the past twelve months, and it is not surprising that many concerns suffered a set-back. After charging debenture interest, the net profit realised by **Hugh Stevenson and Sons, Ltd.,** during the financial year ended September 30 last was £37,910 as compared with £54,598 for the previous twelve months. Subject to directors' additional remuneration, the sum of £11,866 was brought forward from the 1928-1929 appropriation, and out of the disposable balance £3,244 is again provided for premium on insurance policy, the balance being then divided into thirds in accordance with the trust deed, £11,555 being provided for the redemption of debenture stock, the same amount allocated to depreciation and maintenance, and an equal amount for distribution. The company was registered in 1920, and has factories in Birmingham, Manchester, Leith, and Glasgow, as well as in London, the paid up capital being £322,500, comprising £300,000 in preferred ordinary shares of 13s. 4d. each—recently quoted around 5s.—and £22,500 deferred 1s. shares, and the amount distributed is 6d. per share on the preferred ordinary capital, the sum carried forward being higher at £12,670. The following are some of the principal balance sheet items :

	Sept. 30, 1930.
	£
Outstanding 6% Debentures	26,633
Outstanding 7% Debentures	109,209
Debtors	62,044
Stocks	91,711
Cash	7,389
Goodwill, Patents, etc.	65,000
Creditors	57,625

The preference dividend has been postponed in the case of **Henry Faulder and Co., Ltd.,** confectionery manufacturers, registered in 1889. At December 31, 1928, the profit and loss account showed a credit balance of £296, but during 1929 a loss of £21,955 was sustained, converting the credit balance into a debit of £21,659. This was reduced to £12,211 by transferring £9,448 from reserves, but the dividend of 5 per cent. on the company's £12,500 cumulative preference shares of 12s. 6d. each accounted for £625, while reorganisation expenses amounting to £330 were written off, the result being a debit balance of £13,166 to be carried forward, thus :

	£	£
Balance brought forward from 1928	296	
Loss—year ended December 31, 1929	21,955	
Debit Balance		£21,659
5% dividend on £12,500 Cumulative Preference Shares 12s. 6d.		625
Reorganisation Expenses written off		330
		£22,614
Less transferred from Reserves		9,448
Debit Balance carried forward		£13,166

The ordinary share capital is £18,000 in 1s. shares.

The preference dividend has also been postponed by **H. H. and S. Budgett and Co., Ltd.,** wholesale grocers and drysalters. The company's accounts are made up to February 28 each year, and are usually submitted in July, and the last accounts disclosed a net profit of £24,917. The dividend on the ordinary share capital was reduced from 2½ per cent. to 2 per cent., and the sum of £7,110 carried forward. The company's dividend record for the last five years is as follows : 1925-1926, 5 per cent. ; 1926-1927, 5 per cent. ; 1927-1928, 2½ per cent. ; 1928-1929, 2½ per cent. ; 1929-1930, 2 per cent.

The authorised share capital is £750,000 in £1 shares, of which £410,000 has been issued and paid up—viz., £360,000 7½ per cent. cumulative preference, recently quoted at 17s. 8d., and £50,000 ordinary shares.

As last year, an interim dividend of 2½ per cent. has been paid by **Johnson, Cole, Brier and Cordrey, Ltd.,** ice manufacturers, etc. The company was registered in 1886 and owns freehold cold storage in Galley Wall Road, Bermondsey, the authorised share capital being £150,000, of which £130,646 has been issued and paid up in the form of £1 shares of one class only. The last accounts covered the twelve months ended May 31, 1930, and disclosed a net profit of £7,397 as compared with £5,099 for the previous year, the appropriation figures being as follows :

	£	£
Brought forward from 1928-1929	324	
Net Profit—year ended May 31, 1930 ...	7,397	
Disposable Balance		£7,721
5% dividend on £130,646 shares of £1 each ...		6,532
Carried forward to 1930-1931		1,189
		£7,721

That amalgamation does not always result in economy and efficiency is proved by the report of **Amalgamated Fruiterers, Ltd.,** covering the twelve months ended August 31 last. The gross profit for the year was only £2,792, and, after charging £6,278 for depreciation, the net loss amounted to £6,505. This company was registered in 1928, and in two years a loss of £11,153 has been sustained, whereas prior to the amalgamation twenty shops realised an annual profit of £30,000. The balance sheet shows £54,570 under the heading of goodwill and £31,128 for preliminary expenses.

The dividend on the 8 per cent. cumulative preferred ordinary shares of **L. Rose and Co., Ltd.,** lime-juice growers, juice and

wine merchants, etc., which was due on January 31, has been postponed.

On January 19 a compulsory winding-up order was made against **Automatic Confections, Ltd.**, a company registered in 1928 for the purpose of acquiring exclusive rights in an automatic confection machine and in machine sales of Rogall's French nougat and confectionery.

In future, **Bovril** 7½ per cent. cumulative ordinary shares and deferred shares are to be dealt with on the New York Curb Exchange by means of American Depository Receipts issued by the Guaranty Trust Co., of New York.

At a special meeting of Apollinaris and Johannis, Ltd., held on January 13 last, resolutions were passed adopting new articles of association, and changing the name of the company to **Apollinaris and Presta, Ltd.**

At the meetings of the fully paid ordinary shareholders and the partly paid ordinary shareholders of the **British Feeding-Meals and Milk Products Co., Ltd.**, recently directed by the court, a scheme of arrangement was approved.

STOCK AND SHARE MARKETS

Quotations of issues in the food sections of the London and Provincial Stock Exchanges during the past month have been erratic, the sharpest movements being in Unilever ordinary shares, which rose from 33s. 9d. to 39s.; Spillers ordinary shares from 22s. 4d. to 25s.; United Molasses ordinary from 16s. to 12s. 6d.; and Liebig's ordinary from 14½ to 11. At 28s. 6d. Cadbury 8 per cent. second preference were 1s. higher, and Associated Biscuit 6½ per cent. preference hardened to 23s. 9d. Bovril ordinary declined from 25s. to 24s., but the 6 per cent. preference were higher at 23s. 6d., as also were the 4½ per cent. debentures at 89. British Thomson Houston 7 per cent. preference moved up to 24s. 4d., but W. and T. Avery ordinary were 8s. lower at 45s. Home and Colonial issues were decidedly stronger, while Crosse and Blackwell lost ground.

STOCK AND SHARE LIST

	Feb., 1931.	*Par Value*	*Jan.*, 1931.
Aerated Bread: Ord. ...	17/10	£1	18/3
6½% Pref.	21/-	£1	21/3
Apollinaris: Ord.	5/9	£1	6/-
Assoc. Biscuit: 6½% Pref. ...	23/9	£1	23/6
Avery (W. and T.): Ord. ...	45/-	£1	53/-
Benger's Food: Ord. ...	30/6	£1	30/-
6% Pref.	4⅝	£5	4⅝
Bovril: Ord.	24/-	£1	25/-
Deferred	34/6	£1	36/9
6% Pref.	23/6	£1	23/-
4½% Deb	89	£100	88
British Aluminium: Ord. ...	29/9	£1	30/-
6% Pref.	21/6	£1	21/6
British Thomson Houston:			
7% Pref.	24/4	£1	23/-
Bucknall (H.) and Sons: Ord.	20/-	£5	20/-
Cadbury: 8% 2nd Pref. ...	28/6	£1	27/6
Callard, Stewart and Watt:			
6% Pref.	17/-	£1	17/-
Carrs: 6½% Pref.	20/3	£1	20/2
Cerebos: Ord.	6⅜	£1	6½
Chivers: 6% Deb.	102	£100	102
Cinzano: 7½% Pref.	21/-	£1	20/9
Clark's Bread: Ord.	21/6	10/-	22/-
Criterion Restaurants: Ord.	6/9	5/-	6/8
Crosse and Blackwell: Ord.	1/8	1/-	1/9
7½% Pref.	10/6	15/-	11/-
6½% Deb.	93	£100	97
English and Dutch Meat:			
8% Deb.	50	£100	50
English Margarine: Pref. ...	23/3	£1	23/2
Foster Clark: Ord.	50/-	10/-	50/-
Fry's 8% "B" Preferred ...	22/3	£1	22/3
Fullers: Ord.	33/9	£1	33/8
7% Pref.	18/6	£1	18/2
H.P. Sauce: Ord.	96/-	£1	97/6
Holbrooks: Ord.	15/-	5/-	16/-
5% Pref.	4¼	£5	4⅜
Hill (W.): Ord.	5/-	£1	5/-
Home and Colonial: Ord. ...	14/10	4/-	14/4
15% Cum. Ord.	51/-	£1	49/5
6% Cum. Pref.	5¼	£5	5 11/16
Hovis: 6% Cum. Pref. ...	23/3	£1	23
Imperial Chemical: Ord. ...	16/7	£1	17/10
Deferred	4/6	10/-	5/-
7% Cum. Pref.	21/4	£1	21/11
International Tea: Ord. ...	19/8	5/-	19/3
6% 1st Pref.	22/6	£1	23/-
7% "A" Pref.	25/6	£1	24/5
Jones (R. E.): Ord.	1/9	5/-	1/6
10% Pref.	8/-	£1	7/-
Jurgens:			
7% Cum. Partg. Pref. ...	23/6	£1	23/2
Kia-ora: Ord.	7/10	10/-	7/6
Liebigs: (Reg.)	10⅞	£5	14¼
(Bearer)	11	£5	14½
5% Pref.	99/10	£5	99/9
Lipton: Ord.	4/3	1/-	4/1
5% 1st Pref.	7/6	10/-	7/6
6% Pref.	8/2	10/-	8/-
6% Deb.	98½	£100	99
Lovell and Christmas: Ord.	10/7	£1	11/-
Lyons: Ord.	95/-	£1	95/-
"A" Ord.	94/6	£1	92/-
5% Pref.	21/-	£1	20/3
6% Preferred Ord. ...	23/-	£1	22/-
7% Pref.	27/6	£1	26/3
8% Pref.	31/-	£1	29/3
Mather and Platt: Ord. ...	35/-	£1	38/-
Maypole Dairy:			
20% Preferred	16/-	5/-	16/-
Deferred	4/4	2/-	4/6
5% Pref.	20/-	£1	19/6
Meadow Dairy: 7½% Pref. ...	23/8	£1	23/9
Mellin's Food: 6% Cum. Pref.	3/9	£1	3/9
Molassine: 7% Pref.	10/6	15/-	10/6
Nathan (J.): Ord.	2/-	1/-	2/1
7% Pref.	16/9	£1	17/6
8% Preferred	7/6	10/-	7/6
Nestlés: 8% Pref.	20/6	£1	20/8
Pascall (J.): 8% Preferred ...	8/6	£1	8/6
Peak Frean: 5% Pref. ...	18/2	£1	18/1
8% "A" Pref.	26/3	£1	26/11
Radcliffs Edible: Ord. ...	2/-	1/-	2/-
8% Pref.	8/6	10/-	8/-
Radiation: Ord.	33/6	£1	35/-
6% Pref.	22/6	£1	22/9
Salt Union: Ord.	29/9	£1	31/3
7% Pref.	30/-	£1	33/-
4½% Deb.	82	£100	82
Schweppes: Deferred ...	30/9	£1	32/6
4% Deb.	78	£100	78
Scribbans: Ord.	14/3	£1	14/-
Deferred	2/-	1/-	1/11
Smithfield & Argentine Meat:			
7½% Cum. Pref.	16/6	£1	15/3
Smith's Potato Crisps: Ord.	9/-	5/-	8/6
Spiers and Pond: Ord. ...	14/6	10/-	17/6
6½% Pref.	20/10	£1	20/3
5% Deb.	96	£100	95
Spillers: Ord.	25/-	£1	22/4
6% Pref.	19/7	£1	19/6
Deferred	8/-	£1	7/1
Tate and Lyle: Ord. ...	36/8	£1	36/6
6½% Pref.	24/6	£1	24/6
Unilever: Ord.	39/-	£1	33/9
7% Preferred	24/-	£1	23/6
Union Cold Storage: 6% Pref.	21/-	£1	20/10
7% Pref.	22/9	£1	22/6
10% Pref.	28/3	£1	27/3
United Caterers: Ord. ...	8d.	5/-	8d.
United Dairies: Ord. ...	32/-	£1	31/7
6% Pref.	22/6	£1	22/3
United Glass Bottle: Ord. ...	20/9	£1	20/8
United Molasses: Ord. ...	12/6	£1	16/-

New Companies

CREAMERS (ERDINGTON), LIMITED. (252801.) To take over the bus. of bakers and confectioners cd. on at 212, High Street, Erdington, and at 199, Aston Road, Birmingham. Nom. Cap.: £5,000 in £1 shares. Dirs.: J. H. Freemantle, Freeholme, Rollason Road, Erdington, Birmingham; A. W. Gosling, 250, Boldmere Road, Erdington, Birmingham; Florence M. Hopkins, 18, Queen's Road, Erdington, Birmingham; W. F. Tayler, 199, Aston Road, Birmingham; W. T. Bertram, 22, Endwood Court Road, Handsworth Wood, Birmingham. Qual. of dirs.: 100 shares. Remun. of dirs.: As voted by the company.

HUTH COFFEE SALES, LIMITED. (252815.) To carry on the bus. of importers and exporters of and dlrs. in coffee, cocoa, sugar, tea, and other goods, etc. Nom. Cap.: £5,000 in £1 shares. Dirs.: To be appointed by the subs. Subs.: W. F. Marlow, 30, Weybridge Road, Thornton Heath (clk.); L. A. Stewart, 154, Leighton Avenue, Leigh-on-Sea (clk.).

BUSBY POND POULTRY FARM, LIMITED. (253961.) To carry on the bus. of importers and exporters of and dlrs. in poultry, eggs, etc. Nom. Cap.: £4,000 in £1 shares. Dirs.: F. E. Rist, Papillon, Appleton Road, Linthorpe, Middlesbrough; Mrs. E. Rist, Papillon, Appleton Road, Linthorpe, Middlesbrough. Qual. of dirs.: 300 shares. (F. E. Rist is permt. mang. dir.) Remun. of dirs.: As voted by the company.

JOHNSONS (PONTEFRACT), LIMITED. (253972.) To take over the bus. of a wholesale and retail baker, confectioner, butcher, etc., cd. on at Pontefract as "Charles Johnson." Nom. Cap.: £5,000 in £1 shares. Dirs.: Chas. Johnson, 6, The Mount, Pontefract (perm. gov. dir.); Harriet Johnson, address not stated; Chas. Johnson, junr., 6, The Mount, Pontefract; Clement Johnson, address not stated; W. E. Johnson, address not stated. Qual. of gov. dir.: 1,000 shares; of dirs.: £100 shares. Remun. of dirs.: £100 per annum, divided between them.

BUTCHER THOMSON (CASINGS), LIMITED. (253846.) To carry on the bus. of buyers, cleaners, mnfrs., and suppliers of sausage skins, etc. Nom. Cap.: £500 in £1 shares. Dirs.: G. Butcher, 3, Rosslyn Court, Ornan Road, N.W. 3.; J. G. Thomson, Riversdale Road, Maple Road, Surbiton.

GEORGE FOULDS, LIMITED. (253967.) To take over the bus. of a butcher cd. on by G. L. W. Foulds at 42, Yorkshire Street, 46, Whitehall Street, and 30, John Street, Rochdale. Nom. Cap.: £3,000 in £1 shares. Permt. dirs.: G. L. W. Foulds, 42, Yorkshire Street, Rochdale; T. Parker, 870, Oldham Road, Rochdale. Qual. of permt. dirs.: 1,000 shares; of other dirs.: 100 shares. Remun. of dirs.: As voted by the company.

RURAL RESTAURANTS, LIMITED. (253869.) To carry on the bus. of hotel, restaurant, and refreshment room proprs., etc. Nom. Cap.: £5,000 in £1 shares. Dirs.: Not named. Subs.: A. C. Reavenall, Gloucester House, Cornwall Gardens, S.W. 7; D. Winter, 2 to 3, Duke Street, St. James's, S.W. 1 (C.A.).

GOLDEN FOODS, LIMITED. (252873.) Cross Street North, Wolverhampton. To carry on the bus. of dlrs. in wet and cooked fish, etc. Nom. Cap.: £2,000 in £1 shares. Dirs.: F. E. Woodward, The Homestead, Hatton Road, Wolverhampton (permt.); J. A. Phillips, Haven Lodge, Stoke, Coventry (permt.). Qual. of permt. dirs.: 100 ordinary shares; of dirs.: £50. Remun. of dirs.: As voted by the company.

L. F. THOMPSON AND SONS, LIMITED. (253861.) 897, Christchurch Road, Boscombe, Bournemouth. To carry on the bus. of butchers, etc. Nom. Cap.: £2,500 in 4,000 founders' shares of 5s. and 1,500 ord. of £1. Permt. dirs.: L. F. Thompson, Loddon, Corhampton Road, Boscombe; Mrs. R. C. F. Thompson, Loddon, Corhampton Road, Boscombe; F. L. J. Thompson, Kennet, Corhampton Road, Boscombe; R. F. Thompson, Lucerne, The Avenue, Moordown, Bournemouth. (L. F., F. L. J., and R. F. Thompson are first managers or mang. dirs.) Qual. of dirs.: £200.

SEALCONES, LIMITED. (253835.) To enter into an agmt. with Sealed Milk Containers, Ltd., Sir Ernest R. Debenham, Bt., and T. B. Kitson, for the acquisition of the bus. cd. on by Sealed Milk Containers, Ltd., and all the assets thereof, including the trade-mark "Sealcones," and to carry on the bus. of mnfrs. of and dlrs. in containers for milk, liquids, foods, etc. Nom. Cap.: £63,422 in 48,547 first pref. shares of £1, 277,500 second pref. shares of 1s., and 20,000 ord. shares of 1s. Dirs.: To be appointed by the subs. Qual. of dirs.: £50 shares. Remun. of dirs.: As voted by the company. Subs.: E. M. Fletcher, 12, The Vale, Chelsea (secy.); G. H. Eames, 17, Stonehill Road, Chiswick, W. 4 (clk.); and five others.

ENGLISH PRESERVED FOODS, LIMITED. (253910.) To carry on the bus. of mnfrs. and packers of, agents for, and dlrs. in food products, patent foods, preserved foods, etc. Nom. Cap.: £100 in £1 shares. Provisional dirs.: J. B. Crouch, 116, Chancery Lane, W.C. 2; P. O. Ansell, 459, High Road, Wood Green, N. 22.

"TRANSPROOF" PAPER COMPANY, LIMITED. (253873.) 81, Lamb's Conduit Street, W.C. 1. To take over the bus. of mnfrs. of "Transproof" paper cd. on by G. M. Williams and others. Nom. Cap.: £5,000 in £1 shares. Permt. dirs.: J. P. Watkins, Cartref, Penwortham Road, Sanderstead, Purley (ch.); G. M. Williams, 67, Kendal Avenue South, Sanderstead. Qual. of dirs.: None required.

E. LETTSOME, LIMITED. (253423.) To take over the bus. of wholesale fruit, vegetable, and product mchts. cd. on at Lodge, Brymbo, near Wrexham, as "E. Lettsome." Nom. Cap.: £1,000 in £1 shares (500 ord. and 500 pref.). Permt. dirs.: Eliza A. Lettsome, Cambrian House, Lodge, Brymbo (mang. dir.); Tom Lettsome, Cambrian House, Lodge, Brymbo; Edward Lettsome, 21, Nant Road, Lodge, Brymbo. Qual. of mang. dir.: 500 shares; of other dirs.: 100 shares. Remun. of dirs.: As voted by the company.

BARCLAY'S, LIMITED. (253350.) 54, Chancery Lane, W.C. 2. To carry on the bus. of wholesale and retail confectioners, etc. Nom. Cap.: £3,000 in £1 shares (500 pref. and 2,500 ord.). Dirs.: A. B. Cumming, Newmachar, Aberdeenshire (permt.); S. Cumming, 33, Corringham Road, Wembley Park (permt. and mang. dir.); O. J. Taylor, 33, Corringham Road, Wembley Park. Qual. of dirs.: £1. Remun. of dirs.: As voted by the company.

WESTON RETAIL DAIRIES, LIMITED. (253984.) 60, Orchard Street, Weston-super-Mare. To take over the bus. of a dairyman, etc., cd. on by S. A. Withers and F. M. Lewis at Weston-super-Mare. Nom. Cap.: £2,500 in £1 shares. Permt. dirs.: S. A. Withers, 6, Gerard Road, Weston-super-Mare; F. M. Lewis, 6, Meadow Villas, Weston-super-Mare. Qual. of dirs.: £50 shares. Remun. of dirs. (except mang. dir., if any): As voted by the company.

NOTTINGHAM DAIRY COMPANY, LIMITED. (253978.) To carry on the bus. of wholesale and retail dairy produce salesmen in Nottingham or elsewhere. Nom. Cap.: £5,000 in £1 shares. Dirs.: C. J. Wathes, 18, Castle Boulevard, Nottingham; E. H. Adams, Ruddington Lane, Wilford, Notts. Qual. of dirs.: £100 shares.

IMPORTERS' RETAIL SALEROOMS, LIMITED. (253396.) 150, High Street, Bromley, Kent. To take over the bus. of wholesale and retail tea, coffee, and cocoa mchts. cd. on at Bromley as "The Importers Co." Nom. Cap.: £2,000 in 1,900 pref. shares of £1 and 2,000 ord. of 1s. Permt. chairman and mang. dir.: E. C. E. Pinkerton, The Noke. Qual. of dirs. (except E. C. E. Pinkerton): 10 shares.

KNOX, LIMITED. (254367.) To carry on the bus. of dlrs. in potatoes and other vegetables, etc. Nom. Cap.: £2,000 in £1 shares. Permt. gov. dir. and ch.: A. Knox, 77, Hillbrook Road, Tooting. Qual. of dirs.: One share. Remun. of dirs: As voted by the company. Sub.: P. V. Samuell, 71a, Stapleton Road, Tooting Bec, S.W. 17.

Current Literature

Fruit and Vegetable Products

81. New Ruling on Corn Sugar. (*Fruit Prods. Journ.*, 1931, January, p. 133.)
82. Physiological Effect of Raisins on Acidosis. L. G. Laywell. (*Ibid.*, p. 137.)
83. Pectin. E. R. Nelson and H. H. Mottern. (*Ibid.*, p. 138.)
84. Green Olive Investigations. G. Pitman. (*Ibid.*, p. 146.)
85. Tomato Juice or Pulp? C. H. Campbell. (*Glass Package*, 1931, February, p. 116.)
86. Marketing Problems of Canned Fruit. H. G. Adams. (*Canner*, 1931, January, p. 13.)
87. Preserving and Marketing Frozen Fruits. E. S. Reynolds. (*Ibid.*, p. 17.)
88. Decay and Shrinkage in Citrus Fruits. E. D. Stewart. (*Food Ind.*, 1931, February, p. 59.)
89. Conserving Citrus Juice. M. A. Joslyn and G. L. March. (*Ibid.*, p. 71.)
90. Sulphuring Apricots. E. M. Chace, C. G. Church, and D. G. Sorber. (*Ind. Eng. Chem.*, 1930, December.)
91. Vitamins in Olive Oil. L. Margailan. (*Comptes Rendus*, 1930, October, p. 725.)

Cereal Products

92. Scientific Grain Grading. R. C. Sherwood. (*Food Ind.*, 1931, February, p. 67.)
93. New North-west Wheat Flour. C. A. Glabau. (*Bakers' Weekly*, 1930, November, p. 51.)

Dairy Products

94. Butter Marking. (*Milk Industry*, 1931, February, p. 75.)
95. National Dairy and Ice-Cream Convention. (*Ibid.*, p. 33.)

Analysis

96. Determination of the Milk Proteins. G. M. Moir. (*Analyst*, 1931, February, p. 73.)
97. Detection of Heated Milk. K. Eble and H. Pfeiffer. (*Z. Unters. Lebensm.*, 1930, p. 311.)
98. Phosphatide Contents of Bread. (*Ibid.*, 1930, p. 315.)
99. Polarising Power of Sugars. Y. Tomada and T. Taguchi. (*J. Soc., Chem. Ind.*, Japan, 1930, p. 434.)
100. Determination of Water in Preserved Tomatoes. A. Leonhard. (*Z. Unters. Lebensm.*, 1930, p. 185.)
101. Formic Acid in Fruit Juices. A. Hanak, J. Kürschner. (*Ibid.*, p. 278.)
102. Determination of Cholesterol and Lecithin. J. Tillmans, H. Riffart, and A. Kuhn. (*Ibid.*, p. 361.)
103. Acido Proteolytic Bacteria in Pasteurised Milk. G. Corini. (*Compt. Rend.*, 1930, No. 191, p. 885.)
104. Cod Liver Oil and Calcium Metabolism. A. D. Holmes and M. G. Pigott. (*Ind. and Eng. Chem.*, 1931, February, p. 190.)

Various

105. Rapid Freezing Methods. (*Ice and Cold Storage*, 1931, February, p. 36.)
106. Meat Processing Costs. (*Nat. Provisioner*, 1931, February, p. 24.)
107. Effects of Quick Freezing on Fruits and Vegetables. C. Birdseye. (*Frozen Foods*, 1931, p. 131.)
108. Lecithin for Non-Chocolate Confections. S. Jordan. (*Manuf. Conf.*, 1931, February, p. 49.)
109. Good Centres for Hard Candies. (*Ibid.*, p. 66.)
110. Preventing Beverage Spoilage. W. L. Owen. (*Food Ind.*, 1931, February, p. 65.)
111. Storage Temperatures for Canned Fruit. E. F. Kohman. (*Ibid.*, p. 77.)
112. Control of Thermophilic Bacteria in Pasteurisation Plants. W. M. Yale and S. Breed. (*Am. Journ. Pub. Health*, 1930, Vol. 20, p. 1192.)
113. Discoloration of Halibut. R. H. Bedford. (*Progress Report* No. 7, 1930, Biological Board of Canada.)
114. Vinegar. M. Pratolongo. (*Giorn. di Chim. Ind.*, 1930, p. 355.)
115. New Method for Making Cake. C. A. Glabau. (*Bakers' Weekly*, 1930, Vol. 67, p. 47.)
116. Bakers' Yeast from Waste Schweniger. (*Ze. des Vereins d. Ingen.*, 1930, October, p. 1412.)

Book Reviews (*continued from page* 84.)

ducts, including acetic acid and ethyl alcohol. In addition, the members of this group produce mannitol from fructose and sucrose and a levulan or dextran from sucrose.

These fundamental physiological characters give justification for placing these organisms in one genus for which the name *Leuconostoc* has priority. A study of the morphology of the members of the genus *Leuconostoc* has shown that they are intermediate in form between the streptococci and the lactobacilli.

Secondary physiological characters have been used for the recognition of species within the genus. Of these secondary characters, the fermentation of the pentoses and sucrose have been found to be the most constant and the species named have been based upon these reactions.

Three species have been recognised in the genus *Leuconostoc* and have been defined as follows:

1. *Leuconostoc mesenterioides* (Cienkowski) Van Tiegham, ferments pentoses (either arabinose or xylose) and sucrose; produces slime in sucrose solutions, and is generally found in fermenting vegetable material and in sugar solutions.

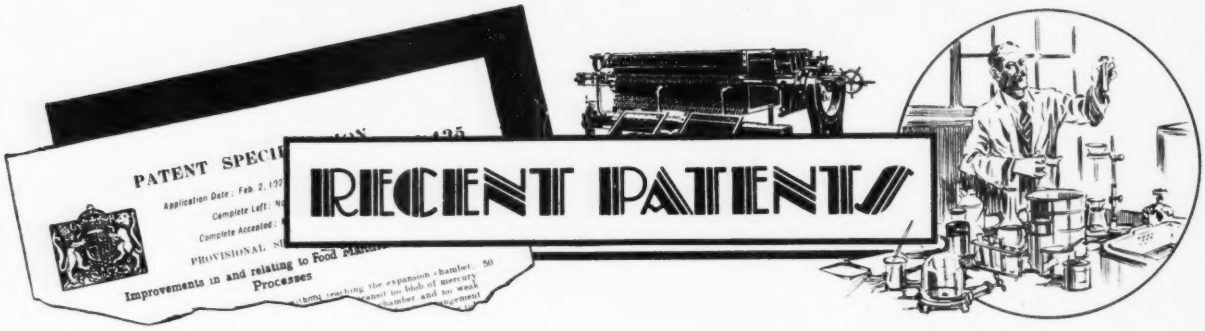
2. *Leuconostoc dextranicus* (Beijerinck) comb. nov., which ferments sucrose but not pentoses, produces a moderate amount of slime from sucrose, and may be associated either with vegetable or with dairy products.

3. *Leuconostoc citrovorus* (Hammer) comb. nov., which fails to ferment either of the pentoses or sucrose, produces no slime from sucrose, and is generally associated with milk or milk products.

Floral Changes in the Fermentation of Sauerkraut. By Carl S. Pederson. *Technical Bulletin*, No. 168, July, 1930. Pp. 37. New York State Agricultural Experiment Station.

A bacteriological study of eight krauts was made. Three of these were normal and five were inoculated with various pure cultures. Several hundred cultures were studied and grouped. Four species—viz., *Leuconostoc mesenterioides* (Cienkowski) Van Tiegham, *Lactobacillus pentoaceticus* Fred, Peterson, and Davenport, *Lactobacillus cucumeris* Bergey, and *Lactobacillus plantarum* (Orla-Jensen) Bergey—have been found to be the most common organisms in fermenting kraut, although many other types have been found. Many of these are strains of species closely related to those mentioned above.

Pure culture inoculation with *Lactobacillus cucumeris* was found to change the flora of kraut, while the quality of the kraut produced was adversely affected. Pure culture or mixed culture inoculation with other organisms did not materially affect the flora or quality of the product. *Leuconostoc mesenterioides* is largely responsible for the early acidity development. The lactobacilli complete the fermentation.



These particulars of New Patents of interest to readers have been selected from the Official Journal of Patents, and are published by permission of the Controller of H.M. Stationery Office.

Latest Patent Applications

2977. BEMIS, K. E. : Preparation of food products. January 29.

2469. COMER, W. T. : Preserving fresh fruits. January 26.

2819. HUDSON, A. A. : Retailing cooked foods. January 28.

2459. PARKINSON, R. H. : Making filling liquors for preservation of foodstuffs, etc. January 26.

2458. PARKINSON, R. H. : Manufacture of containers in which foodstuffs, etc., are hermetically sealed. January 26.

Specifications Published

342,098. APLIN AND BARRETT and WESTERN COUNTIES CREAMERIES, LTD., and OTTIKER, A. E. : Treatment or preparation of cheese.

341,775. GROEBBELS, F. : Method for manufacturing fish food.

341,186. EYON, J. W. : Vessels for cooking and pressing meat.

340,485. HARTMAN, S. H., and WILSON, S. C. : Process for the manufacture of cheese.

340,637. ELION, L., and ELION, E. : Manufacture of yeast.

340,785. BOISSELIER, H. C. : Food preparation or sweetmeat.

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2., at the uniform price of 1s. each.

Abstracts Published

340,070. **Filling confectionery with jam, etc.** LONG, R. W., 13, Marlborough Street, St. James', Bristol. October 18, 1929, No. 31632.

340,017. **Capping bottles.** HARPER, A. S., The Gables, Riverbank, Molesey, Surrey, GREGORY, A. J., 146A, Queen Victoria Street, HIGGINS, D. H. C., 11, Thavies Inn, CHALMERS, F. J. H., 263, Salisbury House, London Wall, all in London, and BEAUMONT, J. E. B., 31, Oakhill Road, Brincliffe, Sheffield. September 16, 1929, No. 28115.

339,879. **Wrapping-machines.** SOUTHALL AND SMITH, LTD. and HOLLIES, J., Villa Street Works, Hockley, Birmingham. February 15, 1930, No. 5153.

339,893. **Lemon, etc., squeezers.** KREUTER, F. H., 240, West Susquehauna Avenue, Philadephia, and SUENDERHAUF, O. L., 3714, Berry Avenue, Drexel Hill, both in Pennsylvania, U.S.A. February 28, 1930, No. 6739.

FOOD MANUFACTURE is sent to any address in the World for 10s. per annum. Send your subscription now to LEONARD HILL, LTD., Thanet House, 231-2, Strand, London, W.C. 2.

Recent Trade Marks

This list of Trade Marks of interest to readers has been selected from the "Official Trade Marks Journal," and is published by permission of the Controller of H.M. Stationery Office.

BONATEX.—518,389. **Edible oils and substitutes for cream for use in filling cakes and confectionery.** THE BONATEX MANUFACTURING CORPORATION, LTD., 144, St. Vincent Street, Glasgow, C. 2. February 4.

PEDIGREE.—519,198. **Tea.** BENJAMIN DANIEL COWEN, 170 to 180, Howard Street, Glasgow. February 4.

HERALDRY.—518,379. **Biscuits.** HUNTLEY AND PALMERS, LTD., King's Road, Reading, and 162, Fenchurch Street, London, E.C. 3. February 4. (By Consent.)

NOUGAMELS.—519,406. **Confectionery.** A. S. WILKIN, LTD., Cremona Park, Benton Road, Newcastle-upon-Tyne. February 4.

COTTAGE CREAM.—509,315. **Biscuits.** PEEK, FREAN AND CO., LTD., 158, Drummond Road, London, S.E. 16. January 28.

MILL BRIDGE.—517,305. **Jams and marmalades.** UXBRIDGE PRESERVING CO., LTD., Mill Bridge Factory, Cowley Mill Road, Uxbridge. January 28.

DIANA.—517,625. **Fish in oil.** BRANDAO GOMES E COMPAHNIA LIMITADA, Esphinho, Oporto, Portugal. January 28.

PROBAC.—508,300. **Yeast, eggs, milk, cream, whey, sugar, honey, garlic, vegetable extract, oranges, lemons, grape fruit, tomatoes, wheat, wheat germs, gluten, bran extract, sweetbread, liver, roe, spices, and cocoa, all for use as ingredients in food.** THE PROBAC FOOD CO., LTD., 204, East Hill, Wandsworth, London, S.W. 18. January 28.

CLAN.—517,878. **Margarine for sale in Scotland and Northern Ireland only.** THE SCOTTISH CO-OPERATIVE WHOLESALE SOCIETY, LTD., 95, Morrison Street, Glasgow. January 28.

VATEL.—518,485. **Preserved fruit, preserved vegetables, and preserved meat, all sold in tins or in glass or earthenware containers.** ERBOS, LTD., 15, Fitzroy Street, London, W. 1. January 28.

ORANGIA.—519,022. **Biscuits.** CARR AND CO., LTD., 54, Church Street, Carlisle. January 21.

KEALARED.—518,661. **Fish.** MAGGS, GOFF AND CO., LTD., Market Chambers, Suffolk Road, Lowestoft. January 21.

YEASTREL.—518,598. **A food preparation made from yeast.** BREWERS' FOODS SUPPLY CO., LTD., 8, High Street, Linlithgow, and 189, Fountainbridge, Edinburgh. January 21.

LOTUS.—516,778. **Eggs, condensed milk, and cheese.** MORRIS ISRAEL, 71 to 73a, New Road, London, E. 1. January 21.

VINCIT TEA.—518,231. **Tea.** TEETGEN AND CO., LTD., 16, New Street, Bishopsgate, London, E.C. 2. January 21.

NESTOR.—518,276. **Nuts for food.** B. M. PHILLIPS, LTD., Monument House, Monument Street, London, E.C. 3. January 21.

SUNRAY.—517,404. **Powdered milk for food.** ALFRED BARCLAY, Manor Farm, Compton, Berkshire. January 21. (Associated.)

PARMIS.—509,150. **Wheaten porridge.** The firm trading as PARMIS CO., Westholme, High Street, Great Eversden, Cambridgeshire. January 21.